

MODERN Machine Shop

APRIL, 1952

OK series 3600
the BLACK ANGUS of face mills with...

More Beef in the Body



For the heaviest cuts that the biggest milling machines can pull.

OK Face Mills, size for size, have more weight, more substance, more beef in the body. And blades are huskier with a greater proportion of carbide available for cutting. It is a proven fact these cutters remove more metal in a given period than other cutters which are complicated and weakened by recesses for screws, pins, gibs or locking devices.

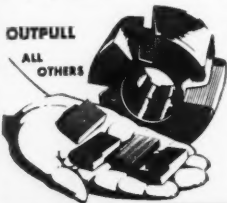
OK cutters consist of just two components—the body and the blades. Blades are simple wedge-

shaped* blocks, serrated on one face with matching serrations in the body. They are solidly seated by a driving fit, easily extracted with a drift, and stay put under the fastest speeds and heaviest feeds. The simple strength and ruggedness permit the placement of more blades in the fine pitch series and heavier blades in the coarse pitch series.

You need the OK competitive advantages. Take your toughest job and let OK engineers have a go at it.

OUTPULL

ALL
OTHERS



*The wedge is the world's simplest and strongest basic mechanical device

OK

**modern milling cutters
for modern milling machines**

THE O.K. TOOL COMPANY, INC.
MILFORD, NEW HAMPSHIRE

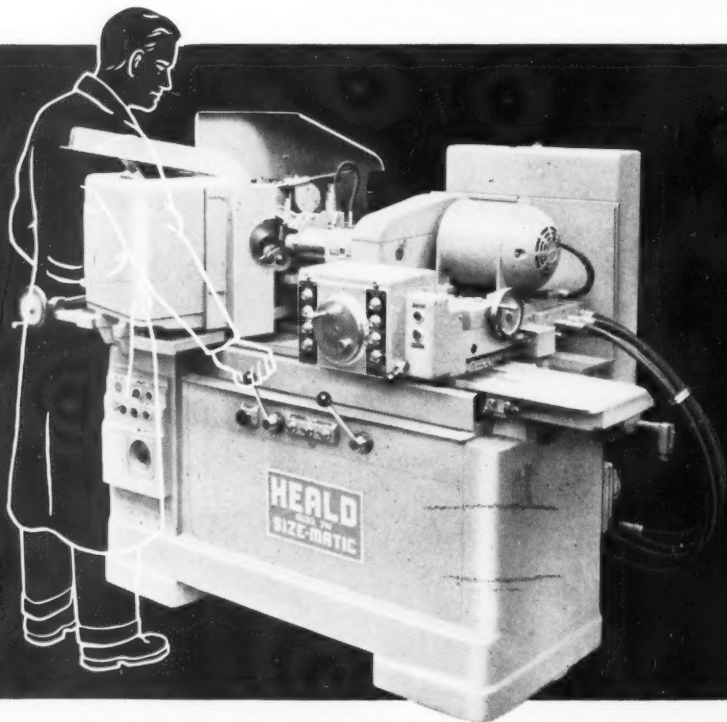


Here's How Heald
helps you get
**CLEANER, SAFER,
BETTER
OPERATION**

**Heald guards and covers
give you 3-way protection**

Guarding is an exact science here at Heald. Every machine is equipped with guards and covers that give maximum safety to operators — prevent spattering of coolant — keep chips, dust and dirt from interfering with machine operation.

This three-way guarding is particularly important right now. It protects you against loss of production. So make sure that all guards and covers are properly in place when the machine is in operation. This simple precaution can help you get the most out of your precision-built Heald Grinding Machines and Bore-Matics.



*Heald machines speed
the nation's production*

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

APRIL, 1952

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ADVERTISING REPRESENTATIVES

RICHARD S. KLINE
GEORGE E. HAY
431 Main St., Cincinnati 2
Main 0182

G. M. FILLMORE
DUNCAN W. BARTON
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THE ROBERT W. WALKER CO.
2330 West Third Street
Los Angeles 5
DUnkirk 7-4388
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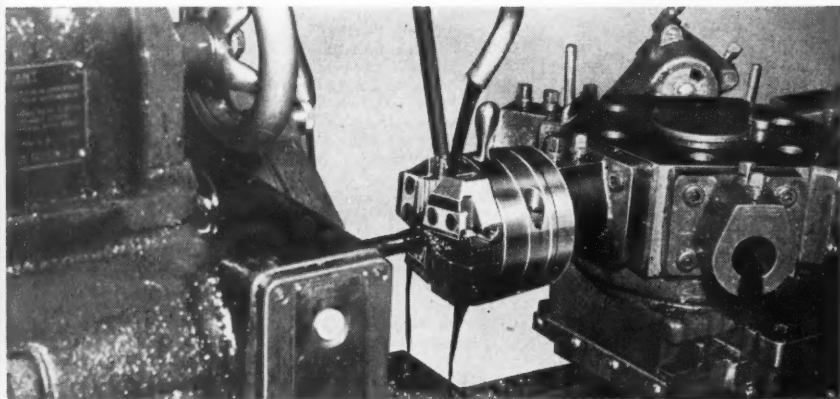
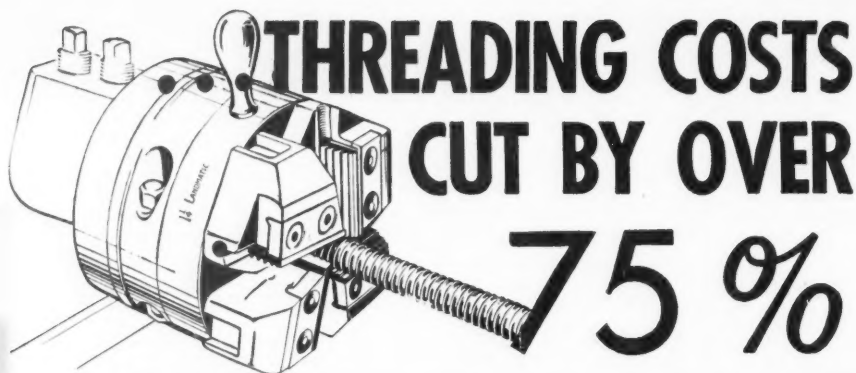
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Time Study records of a large aviation equipment company show still another job where LANDMATIC Heads have effected large savings.

Here, a 1 1/4" LANDMATIC Head with Lead-screws is cutting a 5/8-6 Acme thread on a Stabilizer Screw used by a light aircraft manufacturer. The thread is held to the close tolerance of $\pm .001$ between the P.D. of the thread and the O.D. of the screw, for a full thread length of 5 3/4" on cold-drawn piston stock, Spec. #AISI, B1112.

Former methods required two passes to produce the finished thread—one roughing and one finishing cut. The thread is now cut in one pass in .192 at a spindle speed of 230 R.P.M. Approximately 400 pieces are cut between

chaser grinds. Hand fitting with the mating nut in assembly, previously necessary, has been eliminated. Total cost savings in all operations are in excess of 75%.

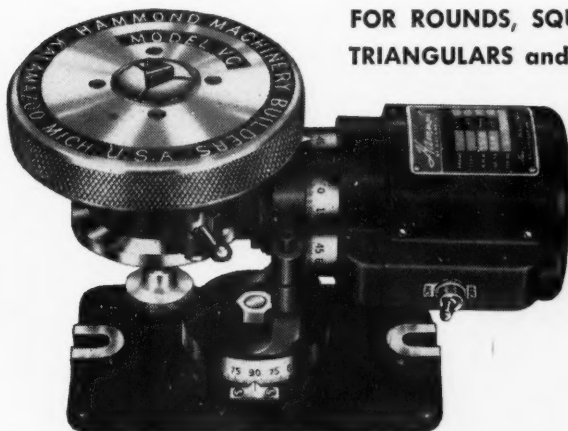
LANDMATIC Heads are stationary with self-opening action designed primarily for turret lathes, featuring an unusually-large oversize capacity. Write for Bulletins F-80 and F-90.

LANDIS Machine
COMPANY
WAYNESBORO • PENNSYLVANIA

Hammond OF KALAMAZOO
GOOD MACHINERY SINCE '82

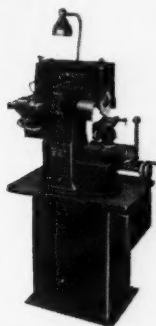
FAST ACCURATE GRINDING of SOLID CARBIDE INSERT TOOLS

FOR ROUNDS, SQUARES,
TRIANGULARS and RECTANGULARS



MODEL VC, Style M Motorized Solid Carbide Insert Grinding Fixture. Style H, without motor also available. Write for Bulletin No. 701.

THE Hammond Solid Carbide Insert Grinding Fixture pays for itself in a few weeks. Offers a fast, economical and accurate means of grinding chip breaker grooves in round, square, triangular and rectangular shapes and for rough and finish grinding of dull and damaged carbide inserts. Motorized Style M with lug base can be mounted on most tool and surface grinders and Hammond C-4, CB-76 and CB-77 Chip Breaker Grinders.



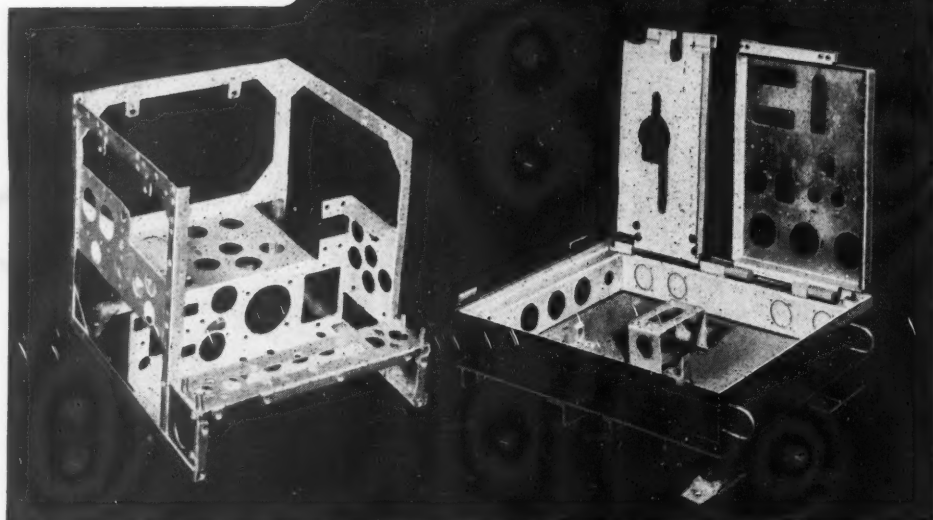
HAMMOND MODEL CB-77 CHIP BREAKER AND DIAMOND FINISHING GRINDER can be supplied with both the standard Any Angle Vise and the Model VC Solid Carbide Insert Grinding Fixture.

BUILDERS OF AMERICA'S MOST COMPLETE
LINE OF CARBIDE TOOL GRINDERS

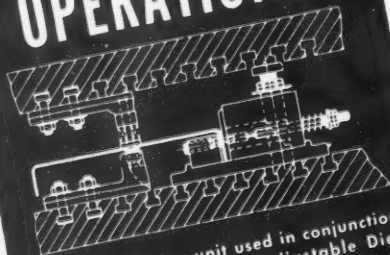
Hammond Machinery Builders
INC.

1615 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

WHISTLER ADJUSTABLE DIES...USED BY OVER 1000 MANUFACTURERS



SIMPLIFYING COMPLICATED PIERCING OPERATIONS...



HU-50 Perforating unit used in conjunction
with standard Whistler Adjustable Dies
on the same job.

LEADING manufacturers find it fast, simple, accurate, and economical to use Whistler Adjustable Dies for the tough jobs. Complicated patterns can be set up quickly. It's easy to change hole arrangements too... without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Savings, through continued re-use of the same dies in different arrangements on many jobs, are most important.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes of punches and dies up to 3" are available in a hurry. Only a few days are necessary to get special shapes made to order.

S. B. WHISTLER & SONS, INC.

740 Military Road Buffalo 17, N. Y.

For more details on this
modern way to speed production and save money,
write for your copy of the Whistler catalog.

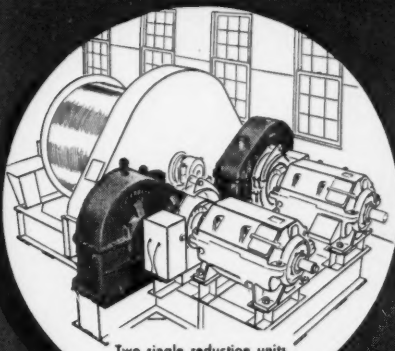


WHY FARREL® SPEED REDUCERS STAND OUT on jobs like these

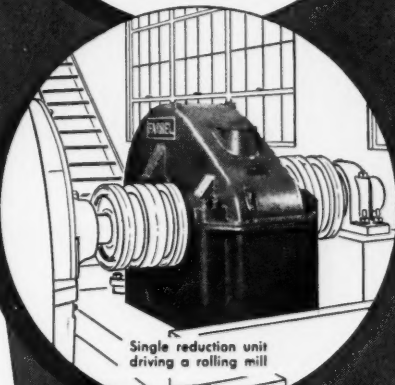
The design of Farrel speed reducers permits an engineering freedom in proportioning gears, shafts, bearings and even some housing dimensions to meet specific requirements. This flexibility has resulted in the solution of innumerable application problems.

In addition, Farrel speed reducers have a number of other advantages which account for their outstanding performance record. These include: (1) precision generated gears made of highest grade materials, (2) shafts and bearings factored to safeguard against interruption of vital processes, (3) gear cases proportioned to withstand repeated heavy peak loads, and (4) joints sealed to prevent entrance of dirt.

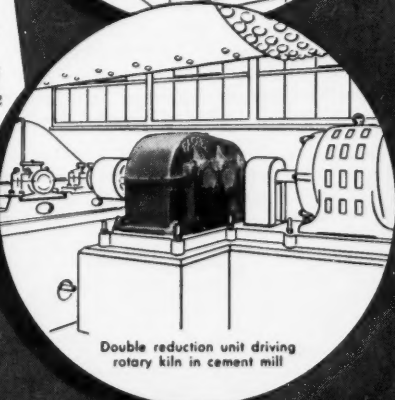
Write for further details of these outstanding units. Ask for a copy of Bulletin 449.



Two single reduction units driving a skip hoist



Single reduction unit driving a rolling mill



Double reduction unit driving rotary kiln in cement mill

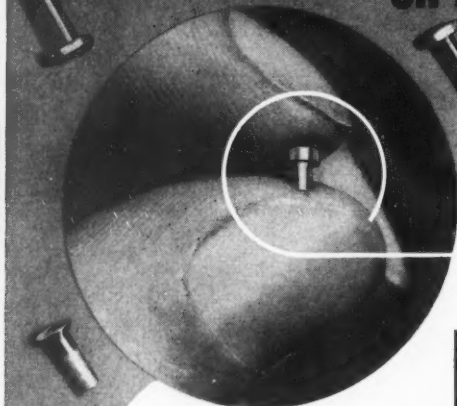
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York,
Boston, Pittsburgh, Akron, Detroit, Chicago,
Minneapolis, Portland (Oregon), Los Angeles,
Salt Lake City, Tulsa, Houston, New Orleans

FB-733

Watchlike Precision

on SMALL PARTS...



Use a DIVERSIMATIC CENTERLESS GRINDER!

ESPECIALLY SUITED TO SMALL DIAMETERS

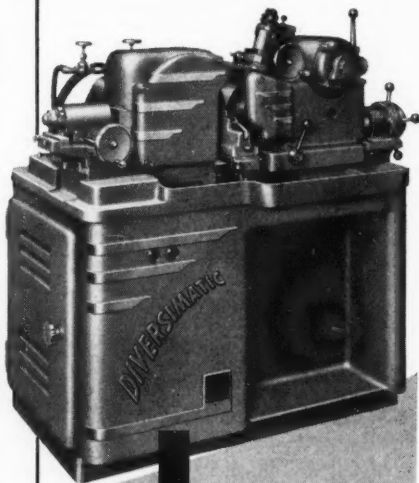
—Diversimatic is built for *small* work. You suffer no loss in production, you get the same high quality on finish and tolerance, but you **SAVE MONEY** by buying a *small* machine for small work!

SAVES FLOOR SPACE—Compact construction with smaller base dimensions means *better* use of available floor space.

LOW OPERATING COST—Smaller horsepower requirements reduce operating expense.

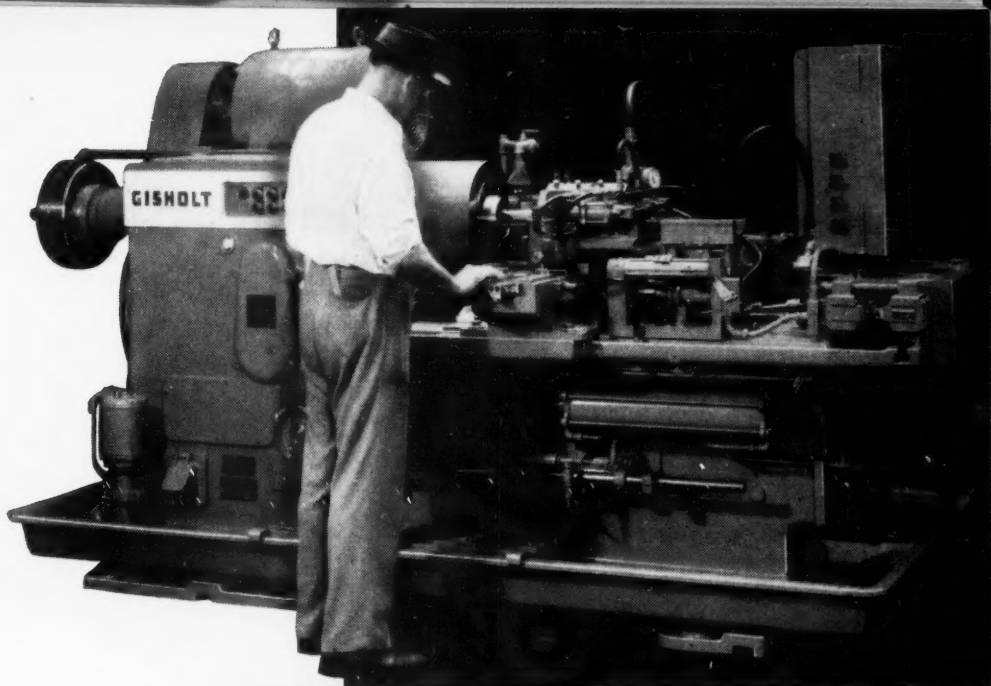
SIMPLE OPERATION—If you can change a grinding wheel you can operate a Diversimatic!

Write for full details on **DIVERSIMATIC**
(formerly called **PROMATIC**)—The
centerless grinder with the spindle
that **NEEDS NO WARM-UP!**



DIVERSIFIED METAL PRODUCTS CO.

5125 Alcoa Avenue
Los Angeles 58,
California



HOW **8** SIMPLIMATICS

*cut machine time 50%
cut man hours 75%*

The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

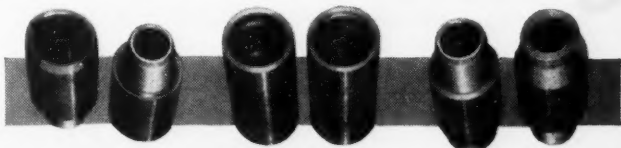
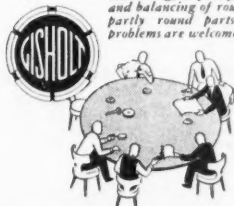
Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic

design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.



In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation: one man can easily tend two machines.

Ask about the many different arrangements possible on the Standard Simplimatics with platen table, vertical head, etc.

GISHOLT MACHINE COMPANY, Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

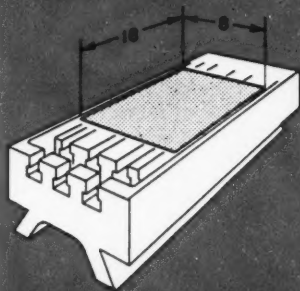
no resetting of the work

WITHIN 8" x 18"

CUTTING AREA

A single setting of the work helps a lot to reduce the cost of any machining operation. It eliminates the troublesome matching of cuts; saves set-up time; improves accuracy. These are direct benefits offered by CINCINNATI 8" x 18" Tool and Die Milling Machines. Chips can be cut throughout the entire rated capacity of the machine—8" x 18"—in one setting of the work.

You'll like this feature when milling the kind of work for which the CINCINNATI 8" x 18" is best suited . . . medium-sized drop forging dies, molds and metal patterns. ¶ Other features of value are illustrated at the right. Complete data is outlined in catalog M-1731. May we send a copy to you?



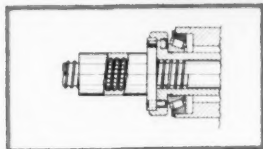
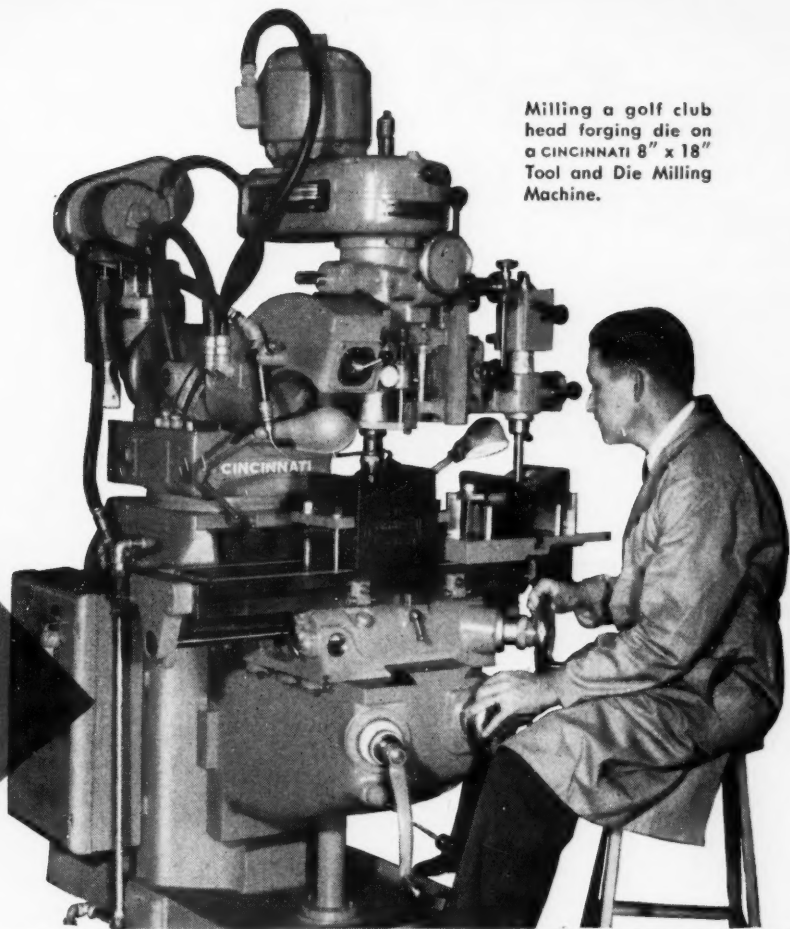
Cutting area in one setting, CINCINNATI 8" x 18" Tool and Die Miller.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

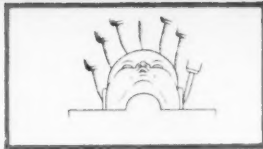


CINCINNATI

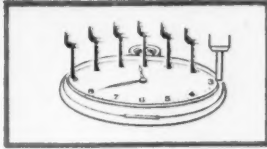
Milling a golf club head forging die on a CINCINNATI 8" x 18" Tool and Die Milling Machine.



Antifriction feed screws . . . do not tire the operator.



Universal cutter head . . . can be swiveled to the angle desired for fine detail milling.



Sensitive, accurate depth tracing unit is automatic . . . permits the use of "soft" masters, such as hardwood, plaster, or cement.

**MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID**

No Time Off **FOR SCHAUER SPEED LATHES!**

GRIND



DE-BURR



CUT-OFF



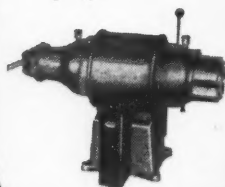
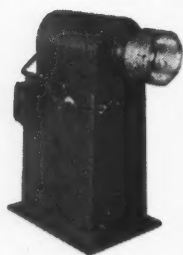
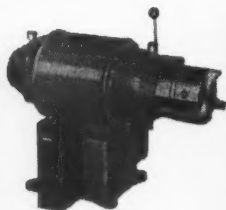
FILE



LAPP



POLISH



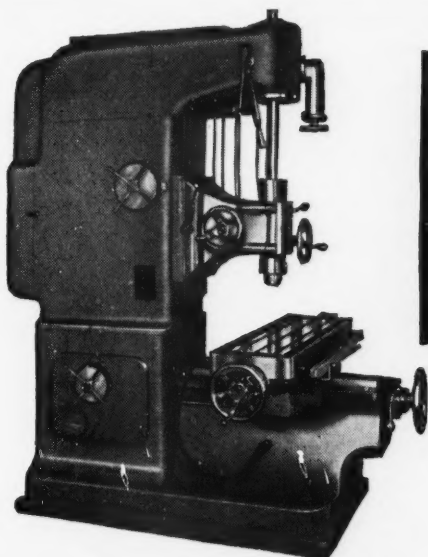
There is such a demand for the Schauer Speed Lathe by manufacturers requiring greater efficiency in the polishing, de-burring, grinding, lapping, filing, etc., of small metal and plastic parts, (that we were not able to demonstrate these versatile units at the A.S.T.E. Tool Show.

There is a Schauer Speed Lathe to solve every small parts secondary finishing job. Just three out of more than 39 models are illustrated here.

Chuck, collet and vacuum holding fixtures. Single speed, two speed and variable speed motors. Horizontal and vertical spindle models. Bench and pedestal types. Investigate their advantages for your production. You'll save with Schauer! Write for Bulletin 500.

SCHAUER MANUFACTURING CORP.

4500 ALPINE AVENUE, CINCINNATI 36, OHIO



**1 MACHINE
THAT DOES THE
WORK OF 2**

Sixteen Spindle speeds, 40 to 2000
r.p.m.—9 Spindle feeds, .005" to .010
—100" rapid traverse per minute in
both directions—16 table feeds, $\frac{3}{4}$ "
to 20" per minute.

KNIGHT NO. 50 VERTICAL MILLING & PRECISION BORING MACHINE

✓ SAVES AT LEAST HALF THE SETUP TIME!

✓ ELIMINATES ALL WORK TRANSFERS

✓ SPEEDS UP OUTPUT—REDUCES UNIT COSTS

- Fast, accurate, versatile, simple and easy to operate
- Handles an extreme range of difficult precision work
- Exceptional cross table travel—extra long spindle travel—complete selection of spindle and table speeds and feeds
- Rugged bed-type construction assures positive accuracy—7½ h.p. motor and all-gear drive furnishes ample power for biggest, toughest jobs
- Convenient, quick-action controls—full vision work areas—easy setup—all save labor, eliminate lost motion, lower unit costs, boost production!

Mail Coupon—Now!

W.B. KNIGHT
MACHINERY COMPANY



3920 WEST PINE BLVD.
ST. LOUIS 8, MISSOURI

ATTACH
TO COMPANY
LETTERHEAD

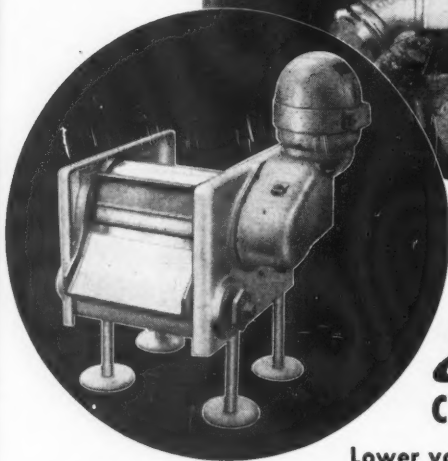
W. B. KNIGHT MACHINERY COMPANY
3920 West Pine, St. Louis 8, Mo.

Send catalog on No. 50 and other Knight Milling
Machines.

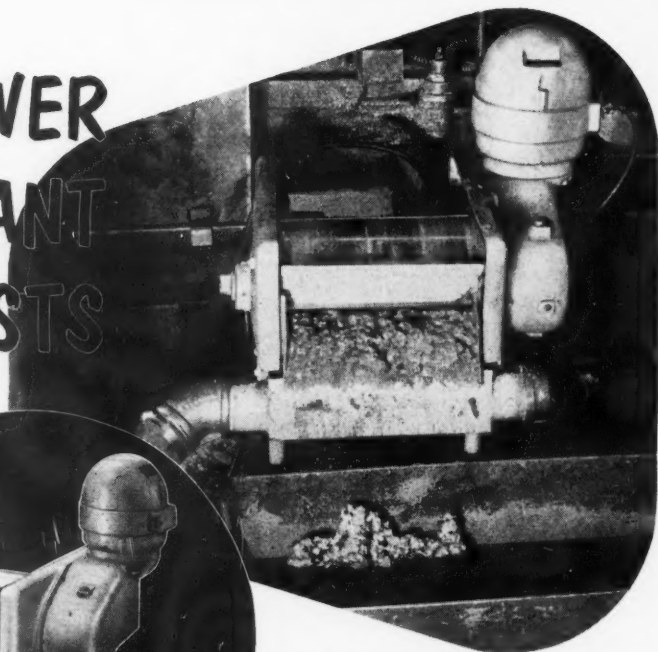
NAME

TITLE

LOWER COOLANT COSTS



- Positive separation
- Dewatered sludge
- Compact, simple to install
- Automatic, continuous operation



WITH THE *Stearns* MAGNETIC COOLANT SEPARATOR

Lower your coolant costs by removing iron chips and swarf with a Stearns Magnetic Coolant Separator. Results:

Less coolant loss • A better finish on the work • Longer life of wheels and tools • Fewer rejects of finished parts

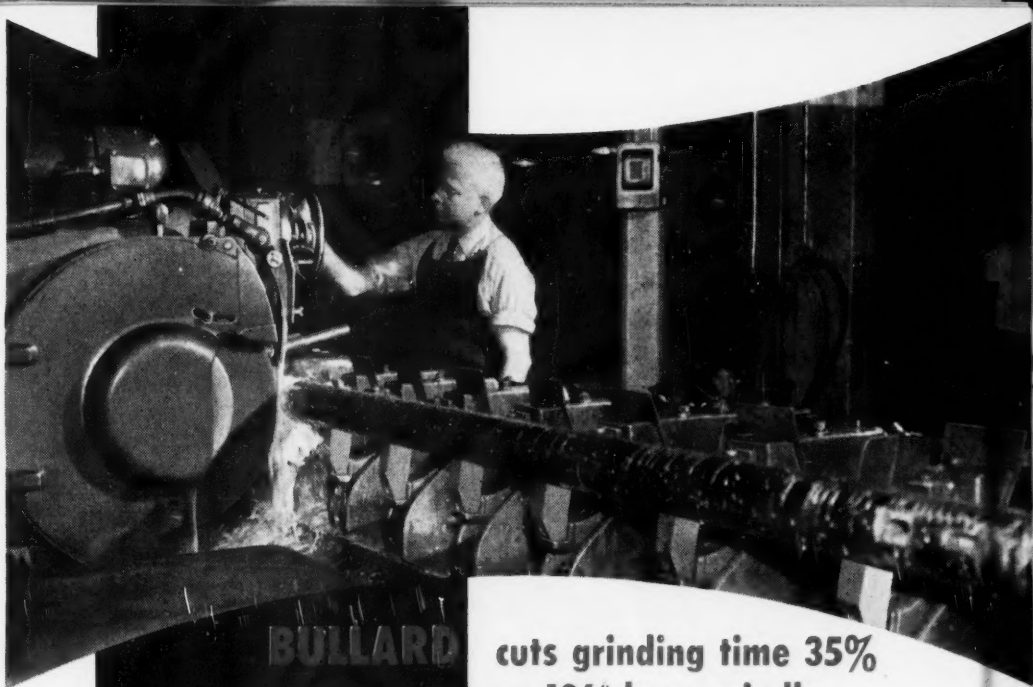
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Foremost in the Magnetic Field
***Stearns* MAGNETIC INC.**

664 SOUTH 28TH STREET

MILWAUKEE 46, WISCONSIN



BULLARD

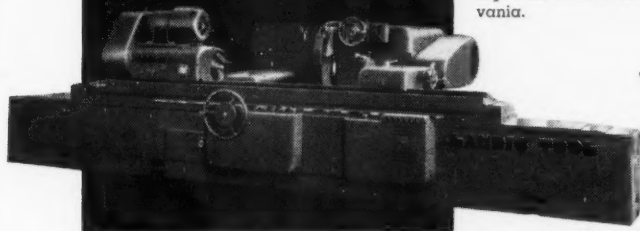
cuts grinding time 35% on 106" long spindle

**Modern Landis Plain Grinder takes heavier
cut than possible on old equipment**

Two keyways in this long Nitralloy spindle for the Bullard Horizontal Boring Machine help make this a tough grinding job.

Seven work rests are used to maintain straightness and roundness to the .0002" tolerance. Filler blocks are used in the keyways at each work rest.

Production gains like this can be made on your grinding operations with modern Landis Grinders. Write for Catalog F-48. Landis Tool Company, Waynesboro, Pennsylvania.



144 AB

LANDIS
precision grinders

Work Data

Machine	Landis 20" x 144" Type F Plain Grinder
Material	Nitralloy—4" diameter x 106" long
Stock Removal	.030" on diameter
Tolerance	.0002" for roundness and size
Production	7 hours grinding time



- for SPEED
- for ACCURACY
- for VERSATILITY
- for ADAPTABILITY
- for MAINTENANCE

TORQOMATIC
by
Jarvis
MACHINE FOR INDUSTRIAL USE

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS



Finest for MAINTENANCE: Requires little or no maintenance.

TORQOMATICS, when used with Jarvis TAPS, make the finest possible combination for low-cost, high-quality tapping. Send for free, illustrated, descriptive literature to The Charles L. Jarvis Company, Middletown, Conn.

**TAPPING ATTACHMENTS • TAPS
and DIES • ROTARY FILES
FLEXIBLE SHAFTS and
MACHINES • TUNGSTEN CARBIDE
REAMERS and MILLS • DRILLS
BORING BITS**

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

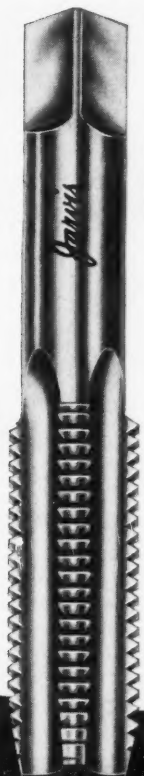
ACCURATE
SQUARES

CONCENTRIC
SHANKS

UNIFORM
FLUTE
SPACING

CONTROLLED
HOOK

PRECISION
GROUND
CHAMFER



Custom Made
at
No Extra
Charge

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

JARVIS POWER TOOLS

TAPPING ATTACHMENTS · TAPS · FLEXIBLE SHAFTS
AND MACHINES · ROTARY FILES · TUNGSTEN CARBIDE
REAMERS AND MILLS · DRILLS · BORING BITS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

Boye & Emmes standard headstock with cover removed, showing constant mesh, wide face gears and large diameter, positive jaw, sliding clutches.

THE LATHE CAME BACK*

After 25 Years

HEADSTOCK GEARING "GOOD AS NEW"

Boye & Emmes Engine Lathe No. 300-141, owned by The Timken Roller Bearing Company, Canton, Ohio, was returned for factory inspection after twenty-five years of day-in-day-out use. During this period,

Timken purchased repair parts from us, for this machine, to the extent of \$154.15. Yet, when the headstock cover was removed at the factory the gearing was found to be "as good as new." This is usual.

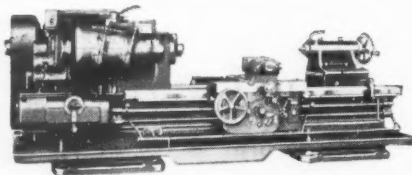
CONSTANT MESH GEARS POSITIVE JAW SLIDING CLUTCHES SPELL OUT THE ANSWER

The principle of power transmission which is used in Boye & Emmes Engine Lathes incorporates constant mesh headstock gearing, with speed changes effected through positive jaw, sliding

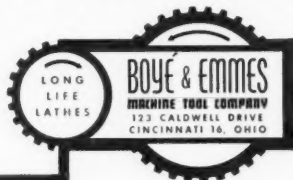
clutches. This construction eliminates gear wear due to shifting action, allows shorter shafts, less space between bearings, and hence more accurate and rigid construction.

FREE LITERATURE

If you are not now using Boye & Emmes Long Life Engine Lathes, investigate. Compare this lathe of low maintenance and high accuracy from every viewpoint. Specifications and details of construction for all sizes are contained in our free Bulletin No. 601. Write for it today!



*One of many documented cases of "no wear" in Boye & Emmes constant mesh lathe headstock, after years of use.



GARDNER

precision
disc

Grinders

Two Operations— One Handling

Accuracy and Finish Improved Grinding Axle Shaft End

A large automotive builder uses this two-head type 723 Gardner grinder to rough and finish grind the splined end of axle shafts. The rotary work carrying fixture locates and clamps the axle in a rotating chuck.

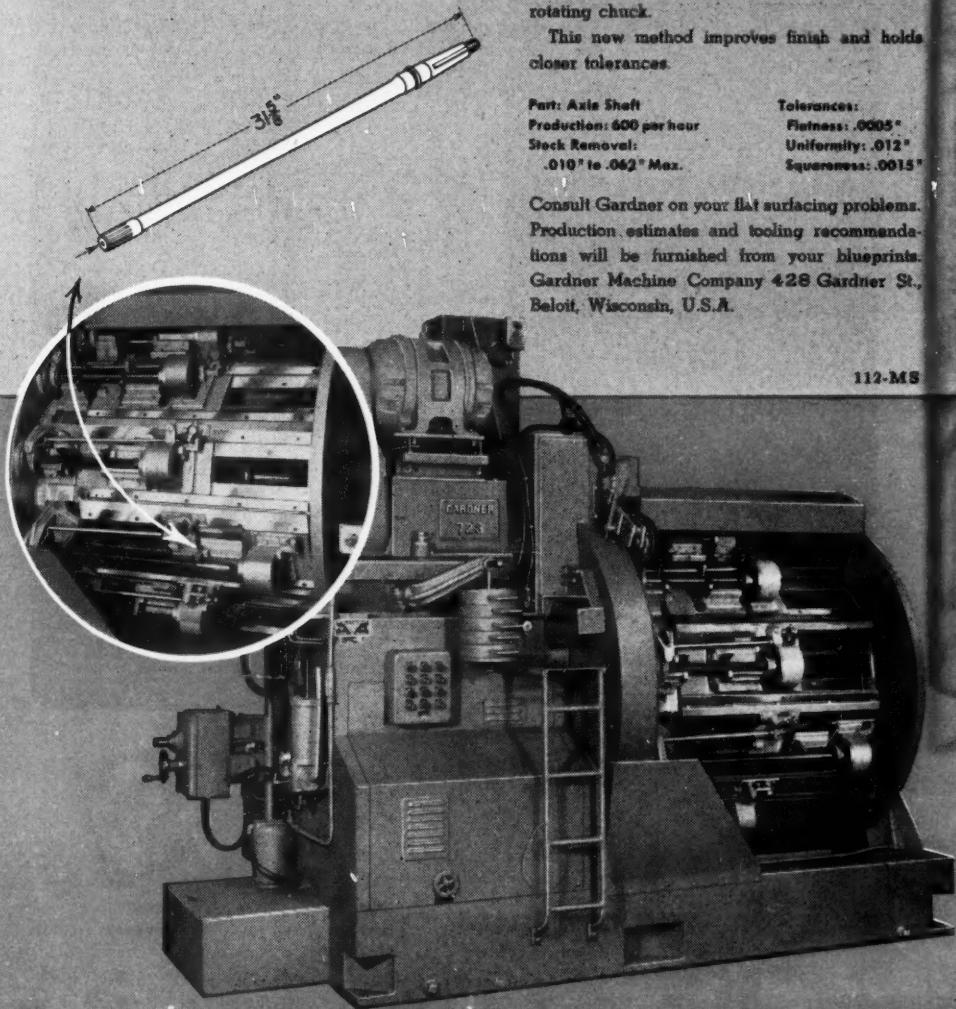
This new method improves finish and holds closer tolerances.

Part: Axle Shaft
Production: 600 per hour
Stock Removal:
.010" to .062" Max.

Tolerances:
Flatness: .0005"
Uniformity: .012"
Squariness: .0015"

Consult Gardner on your flat surfacing problems. Production estimates and tooling recommendations will be furnished from your blueprints. Gardner Machine Company 428 Gardner St., Beloit, Wisconsin, U.S.A.

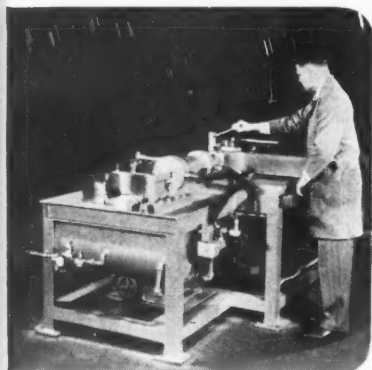
112-MS



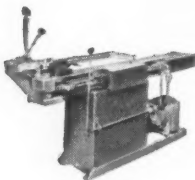
PRODUCTION Short-Cuts with PINES Hydraulic BENDING EQUIPMENT

Tooling Set-Ups Engineered To Meet Your Needs

Here are five examples of bending applications illustrating how Pines machines are successfully employed to save time and cut costs on a wide range of bending work. As shown, different tooling setups are engineered and easily applied to handle a variety of production requirements. Hydraulic power, which is used on all Pines Benders, assures accurate, uniform production results and safe, dependable performance. Push-button controls and automatic operation assure high efficiency and production economy. There's a complete range of Pines Benders designed to handle light or extra heavy work, small lot, or high production runs. Call on Pines engineers when you need help with a bending problem. There is no obligation. Phone Aurora 2-7608.



4. FORMING BLOWER HOUSINGS ON PINES ROTARY BENDER — bends irregular curve (radii of 5-17/32" to 7-3/4") in 5-1/8" wide stock at a speed of 80 pieces per hour. Floating bronze pad acts as a wiper shoe, maintains uniform pressure, assures smooth, wrinkle-free results.



5. PINES SEMI-AUTOMATIC BENDER — tooled for production-line bending of extruded aluminum automotive moldings. Simple setups and easy manual toggle clamping also provides unusual economy for variable short-run and maintenance work not adaptable to fully automatic equipment. Hydraulic power assures uniform results, safe operation.

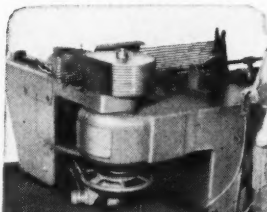
Write TODAY for FREE LITERATURE

Write for free literature describing and illustrating various Pines Benders, attachments, and methods on actual jobs. Find out how Pines Benders are designed to save time and cut costs on a wide range of work.

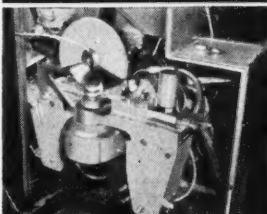
PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

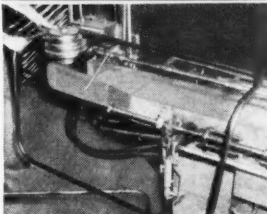
BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY



1. MULTIPLE GROOVE DIE — on Pines Size 3 Automatic Bending Machine forms ten 7/16" x 37-1/2" steel rods simultaneously to a 12" radius for farm implements.



2. DOUBLE DIE AND CUT-OFF SETUP — on Pines Size 3/4 Automatic Bender. Produces 3/4" copper return bands to 7/8" c/r radii automatically, two pieces at a time.



3. TRIPLE RADIUS SETUP — on Pines Size 3/4 Automatic Bender handles three different radii and six 90-degree bends in 1-1/8" tubing in fast sequence. Increases truck seat frame output with less handling.



642 WALNUT • AURORA, ILLINOIS



LIQUID COOLANT COOLERS AND PACKAGED AIR CONDITIONERS*

TAKE THE **HEAT** OFF HIGH SPEED PRODUCTION

Uncontrolled temperatures play havoc with high speed production schedules. Workers and machines are less efficient, both fail to give peak performance unless temperature levels are kept at a constant degree. Here's where Chrysler Airtemp can help. When you install Chrysler Airtemp temperature-control equipment in your plant, production will increase. Costly breakdowns and failures—of men and machines—will be averted. Chrysler Airtemp products are factory engineered and warranted to give effective temperature-control. Mail coupon today for full details on how Chrysler Airtemp can bring you the benefits of proper temperatures in your operations.

LIQUID COOLANT COOLER*

Handles all types of coolants from aqua solvents to heavy tapping and hydraulic oils. Installation permits one cooler to service one or several machines.

PACKAGED AIR CONDITIONERS*

Compact, easily installed. Six available sizes of 2, 3, 5, 11 and 15 ton. Units are factory-assembled and tested.

*COMPLETE FIVE-YEAR WARRANTY

Compressor units in all "Packaged" Air Conditioners and Liquid Coolant Coolers carry an optional five-year warranty, through dealers. This warranty covers compressor replacement, freight to and from the factory, plus a labor allowance for removing and installing compressor assemblies.

Chrysler Airtemp

AIR CONDITIONING • HEATING • COMMERCIAL REFRIGERATION

Airtemp Division of Chrysler Corporation, Dayton 1, Ohio

Airtemp Division, Chrysler Corporation
Dayton 1, Ohio

MMS-4-52

Please tell me how I can boost production with Chrysler Airtemp
☐ "Packaged" Air Conditioners ☐ Liquid Coolant Coolers

Name _____

Firm _____

Title _____

Address _____ Phone _____

City _____ Zone _____ State _____



***"There's NO END to the
types of END MILLS
made by MORSE!"***

You name 'em . . . Morse makes 'em!

From left to right: short and stubby where the smallest, standard mill is required, double-ended if you prefer; with a left-hand spiral but right-hand cut to throw chips ahead; ball end for die cavities, fillets and round-bottomed, holes or slots.

Morse also makes 'em with two flutes, single or double end, cleared so as to cut to center, permitting plunge cutting, in taper shank styles for use direct in

machine spindles; and the shell design, the old standby for face or slab milling cuts.

And there's a wide range of lengths in the exclusive, Morse Hi-Helix, shear-cutting design.

You name the job — Morse makes the End Mills . . . no end of them!

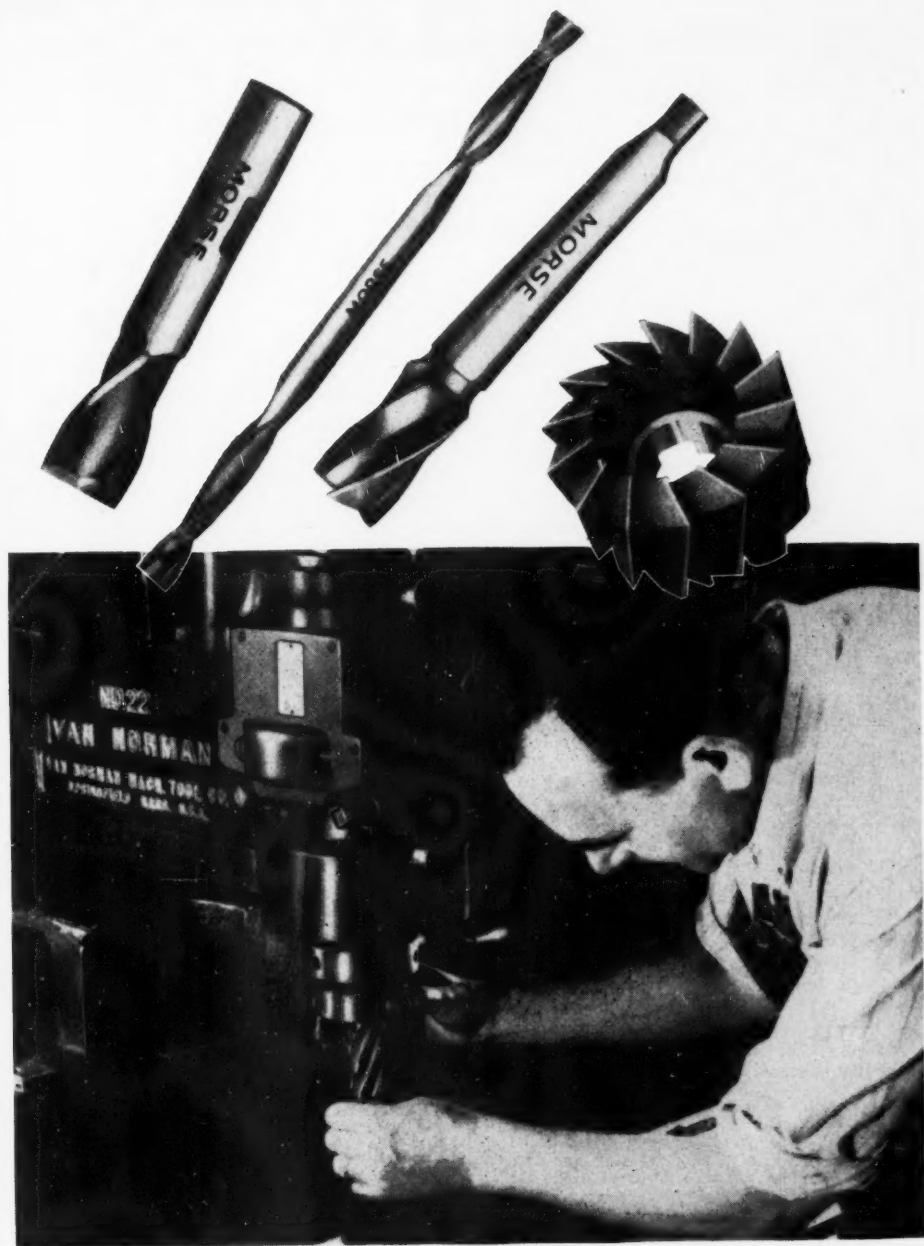
**Morse Twist Drill & Machine Company
NEW BEDFORD, MASS.**

(Div. of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

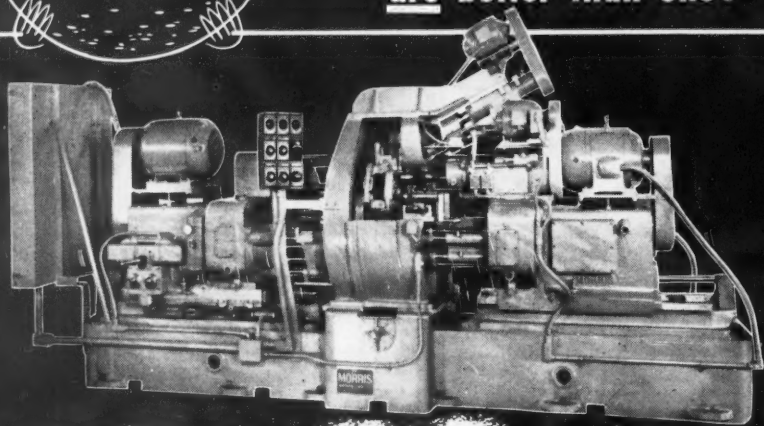
MORSE

Cutting Tools





...TWO HEADS
are better than one!



*Morris "double header" performs
29 operations with a single loading!*

Two heads are definitely better than one when you want higher production at lower cost. The MORRIS Horizontal Two-Way, 6-Station Machine illustrated here is a good example.

It drills, reams, spotfaces and taps all holes in crank shaft main bearing caps, performing 29 operations with a single loading and is production rated at 70 pieces per hour at 80% efficiency.

A self-contained hydraulic unit mounted on a slide on the right-hand side of the machine carries a 14-spindle head. A similar slide on the left-hand side of the machine carries a 12-spindle head. One single spindle unit, mounted angularly at Station 6 drills a 1/4" hole while a lead screw tap feed, mounted horizontally, taps a 5/16-18 hole.

THE MORRIS
MACHINE TOOL COMPANY

934 HARRIET ST., CINCINNATI 3, OHIO

OPERATIONAL SEQUENCE

- STATION 1 Load
- STATION 2 RIGHT HAND HEAD.
Drill 2 holes for 5/16-18 tap.
LEFT HAND HEAD.
Drill Thru 2 17/32 Dia. holes.
Drill Thru 4 37/64 Dia. holes.
- STATION 3 Idle
- STATION 4 RIGHT HAND HEAD.
Spotface and Chamfer 6-
94" Dia. Bosses
LEFT HAND HEAD.
Drill Thru 4 37/64 Dia. holes.
- STATION 5 RIGHT HAND HEAD.
Spotface and Chamfer 4-
94" Dia. Bosses
Chamfer for 5/16-18 tap 2 holes.
LEFT HAND HEAD.
Ream 2 holes .578-.577.
- STATION 6 ANGULAR AUXILIARY UNIT
Drill 1/4 Dia. Angular Hole.
RIGHT HAND HEAD.
Tap 2 5/16-18 Holes.
LEFT HAND HEAD.
Idle.

If your work requires numerous drilling, reaming, tapping, boring and similar operations on a mass production basis, your inquiry is invited.



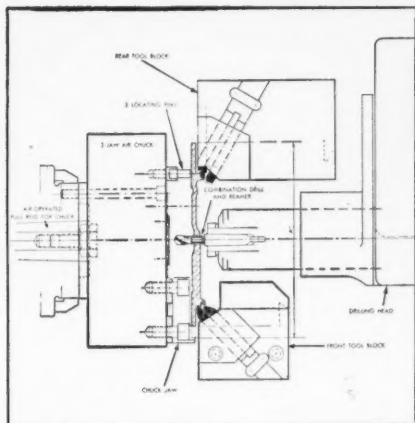
"A better product at less cost—
with PRECISION plus PRODUCTION"

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

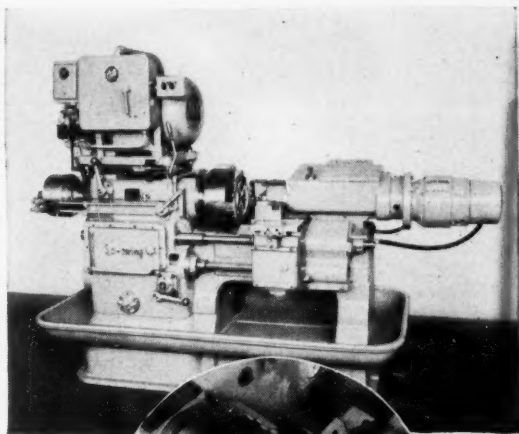
MODEL "LR" Lo-swing DRILLS AND REAMS SIMUL- TANEOUSLY WITH TURNING AND FACING OPERATION

RIGHT
Model "LR" Lo-swing
Automatic Lathe
equipped with Special
Motorized Drilling Head

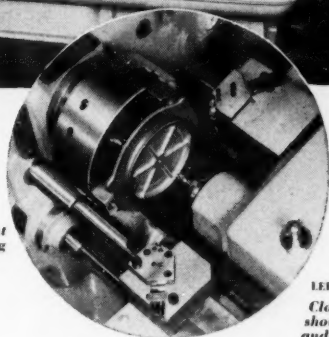


Problem: To turn, face and groove the large diameter of a direct drive clutch, and to drill and ream center hole in a single operation.

Solution: The Model "LR" Lo-swing Automatic Lathe selected for this job was equipped with a special Drilling and Reaming Attachment which replaced the standard tailstock. This attachment is an electrically-driven, self-contained unit with its own feed cam which permits fine feed for drilling and coarse feed for reaming. Two tools on the front carriage turn two diameters. Two facing and one grooving tool are mounted



LEFT
Tooling layout
for machining
and drilling
Direct Drive
Clutch



LEFT
Close-up view
showing tooling
and work

on the back attachment. While all tools, including the drill, operate simultaneously, the motorized drilling head provides the correct speed for drill and reamer, while the main headstock drive provides correct speeds for machining the large diameters.

The work, which is cast iron, is held in a 3-jaw, air-operated chuck. Machining tools are cemented carbide while the combination drill and reamer is of high-speed steel.

Seneca Falls engineers are at your disposal. Let us help solve your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

...SELECT



YOUR LATHES

From the complete line of
76 models built in
LeBlond's 11-acre plant



Here's your guide to better, faster
turning by LeBlond. It describes
LeBlond's complete line of lathes.
Write today for Catalog E.

- 12" TO 50" SWING
- 4' TO 100' BED LENGTH

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

LeBLOND
of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 64 YEARS

**More Accuracy
More Speed
Greater Production
with**

**OLIVER
DIE MAKING
MACHINES**

**OLIVER
OF
ADRIAN**

You don't have to experiment or look afar to find the proper machines for faster and more accurate die making. For almost four decades, the OLIVER Method of making dies by sawing metal with a jig saw and filing by machine methods has proven its efficiency in thousands of plants. As a matter of fact, many OLIVER Die Making Machines have been in continuous use for more than 25 years — proof of their efficiency, speed and accuracy. With OLIVER Die Making Machines skilled labor is not required for sawing, filing and lapping operations. Savings in time and costs are effected up to 60%. Find out for yourself . . . BE WISE, OLIVERize.

Oliver Die Makers available in 5 models —

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write today for complete technical data on Oliver Die Makers

OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

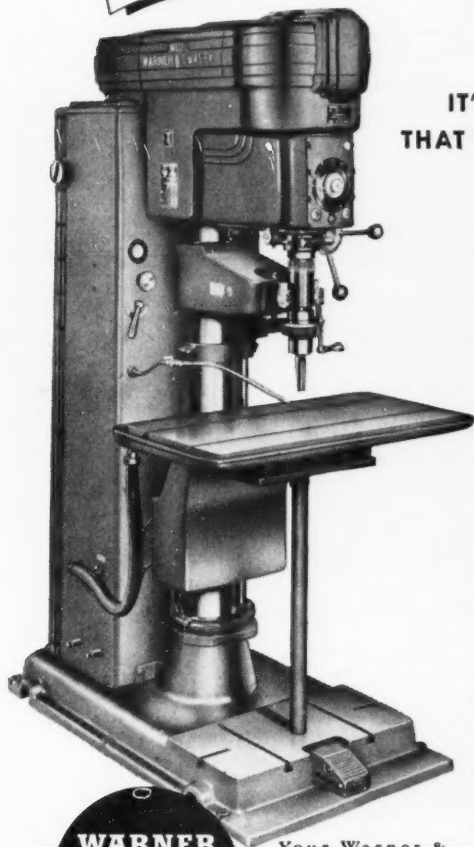
AUTOMATIC DRILL GRINDER
TOOL & CUTTER GRINDERS—DRILL
POINT THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DIE MAKING MACHINES

stock pile

OK

or scrap pile

REJECT



**WARNER
&
SWASEY**
Cleveland

Your Warner & Swasey Field Representative will be glad to show you how a Precision Tapping and Threading Machine can increase production and cut scrap loss in your shop.

IT'S THE FINAL OPERATION THAT CAN MEAN THE DIFFERENCE

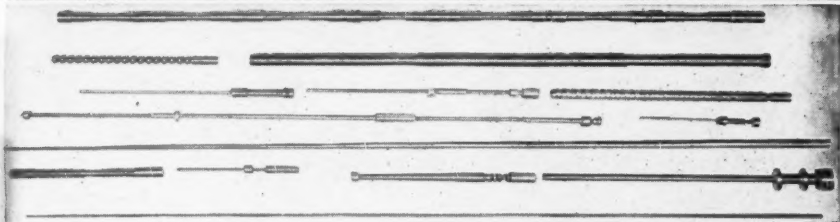
PRECISION tapping and threading is often the final step in finishing a piece that has undergone many previous machining operations. Here is where inaccurate fits or thread errors can mean costly scrap loss, and upset your production schedules.

Warner & Swasey Precision Tapping and Threading Machines drastically reduce these wasteful rejects. These machines feature a radically different and exclusive leading-on principle, with solenoid-actuated guide fingers operating on a lead screw. This provides positive control on tapping and retracting strokes, completely eliminating backlash or drag. A super-sensitive clutch, adjustable to safe torsional resistance, stops the tapping operation immediately when the tap hits a hard spot or chip accumulations, saving spoiled threads or broken taps. Precision depth control assures depth accuracy to within 1/10th of a revolution of the tap or die.

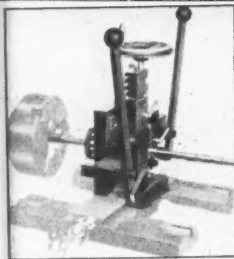
These and other special features insure fast, extremely accurate tapping to Class 3 or 4 gage fits in a wide range of materials—from tool steel to plastics.

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

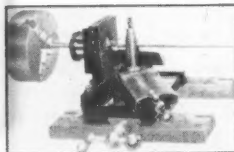
TURN to HIGH PRECISION with ONE PLUNGE CUT, straight or tapered parts to unlimited lengths and diameters, with KARGE TURNOMAT Turning Machine



PARTS like THESE... on your present equipment!



TURNOMAT Turning Machine. 2 or 3 tool position. Mounts on lathe cross slide in place of compound rest. Fits any lathe.



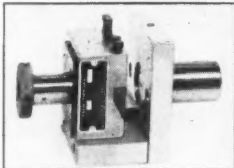
TURNOMAT Live Steady Rest. Wear-proof. Turns tapers, long threads, spirals. For precision centering, drilling, boring, etc.

By an ingenious method of using the bar stock material as a driving or connecting link between lathe or screw-machine spindle, and the TURNOMAT rotating spindle, production of parts similar to those shown above is made possible.

Cutting tools, always positioned on dead center, in very close proximity to nose of TURNOMAT collet, make precision turning equipment of *any* lathe or screw-machine, regardless of condition. Get precision production from the machines *you now have*.

TURNOMATS will cut to unlimited diameters, shoulder-to-shoulder lengths to close tolerances, with perfect concentricity and fine finish. There is no chatter. They will turn to extreme lengths and slenderness.

Karge TURNOMAT Turning Machines, Live Steady Rests, and Box Turners are very rigid, with spindle rotating in high precision, heavy duty, non-friction bearings. Solid positioning of cutting tools makes possible the use of TURNOMATS on machines of all speeds, power and design.



TURNOMAT Box Turner. Wear-proof. For screw-machines and turret lathes. Eliminates rollers or V back rests. Once set to diameter, it stays there!

TURNOMATS are made in four sizes to accommodate bar stock from 1/32" to 1 1/4" in diameter.

U. S. Patent No. 2,464,813. Other U.S. and foreign patents pending.

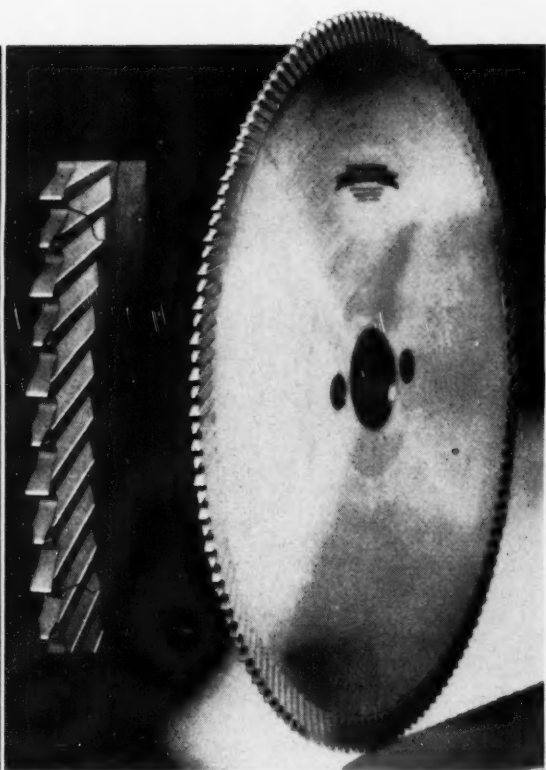
WRITE TODAY

for full information on this remarkable equipment . . .

ADDRESS DEPT. M5

TURNOMAT COMPANY, INC.

BROCKPORT, N. Y.



...here's the Margin of Superiority in

SIMONDS Segmental Saws

See the extra margin of clearance which gives this saw less side-drag, less power consumption and lower heat-generation than any other saw designed for production cutting... on jobs where a smooth cut is required or where fine teeth are necessary on light walled sections. In Simonds design, High Speed Steel segments are riveted into a tough alloy steel plate, giving far greater strength to the saw as a whole. And the alternate beveled and square teeth produce "Tri-vided" chips for faster, easier cutting. This combination of features gives you a metal-cutting saw that cuts straight and true under heavy feed.

Simonds Segmental Saws are one of THREE

TYPES in the Simonds Line of Metal-cutting Saws for ferrous and non-ferrous applications. From a complete range of sizes in Segmental, Inserted Tooth and Solid Tooth Saws, Simonds is able to give you an unbiased recommendation for the type of saw best suited to your particular type of work. See your Industrial Supply Distributor today.

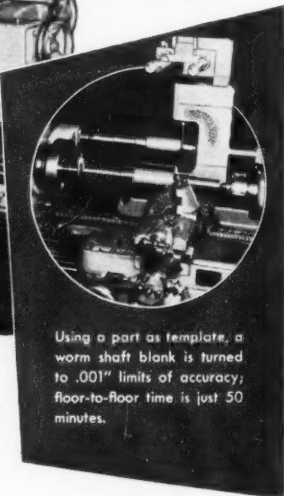


Factory Branches in Boston, Chicago, San Francisco and Portland, Ore. Canadian Factory in Montreal, Que.

LODGE & SHIPLEY *COPYMATIC* Saves **40%** to **70%** time



on 28 different
shaft jobs



... at Bay City Shovels Inc., Bay City, Michigan

In analyzing user reports on the Lodge & Shipley COPYMATIC the same two words pop up again and again: "time saved!" This particular user, a well-known power shovel manufacturer, found the COPYMATIC saved up to 70% in time on a wide variety of jobs.

Other expressions of COPYMATIC superiority are mentioned regularly: "wonderful for tapers and contours . . . very easy to operate . . . very accurate," as stated by Bay City Shovels Inc.

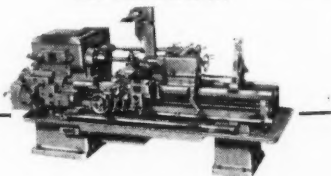
Whatever your product or size of operations, Model "X" engine lathe versatility with the speed and convenience of hydraulically-controlled duplication is a profitable combination for almost any user.

Would you like further information, an explanation of how much the COPYMATIC can save you?

Write today for Bulletin No. 675 and case histories.

THE **Lodge & Shipley**
COMPANY

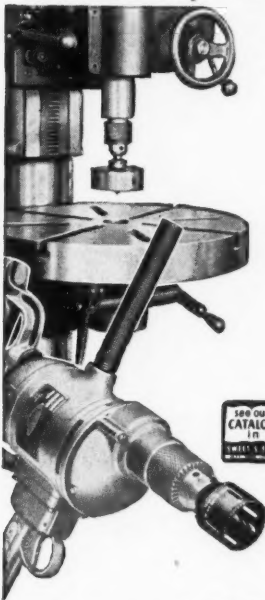
MACHINE TOOL DIVISION • 3057 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO



Cut...

LARGE HOLES

... thru any machineable material up to 1 1/8 INCHES thick!



Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."

MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High Speed-Edge Hole Saws come in 35 sizes, from 3/4" to 4 1/2". They are carried in stock by leading industrial distributors

WRITE FOR BULLETIN ST-650

"MARVEL" has Always had the edge!

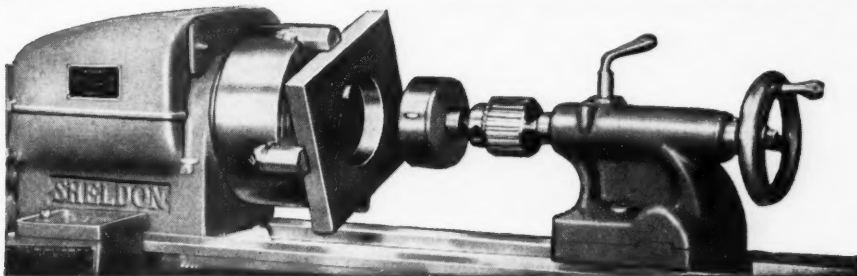


ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue

Chicago 39, U. S. A.





*Know - don't guess -
the Hardness of
your metals...before
and after machining*

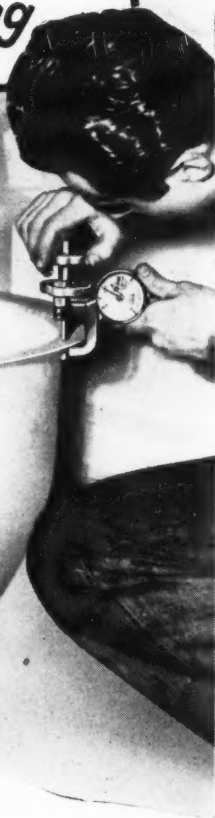
Ames PORTABLE HARDNESS TESTERS

Show the exact hardness of your metals before and after heat-treating, to reduce tool wear and breakage and to speed up production.

Ames Portable Hardness Testers are light in weight and are carried to the work. Tests are easy to make and accurate, requiring no skill.

Ames Portable Testers are used to test flats, rounds, strip, tubing, wire, etc., without cutting off specimens. Saws, gears, knives and large irregular shapes are tested while assembled. Readings are direct in the Rockwell Scales.

Send today for interesting folder
"Rockwell Hardness Testing Made Easy"

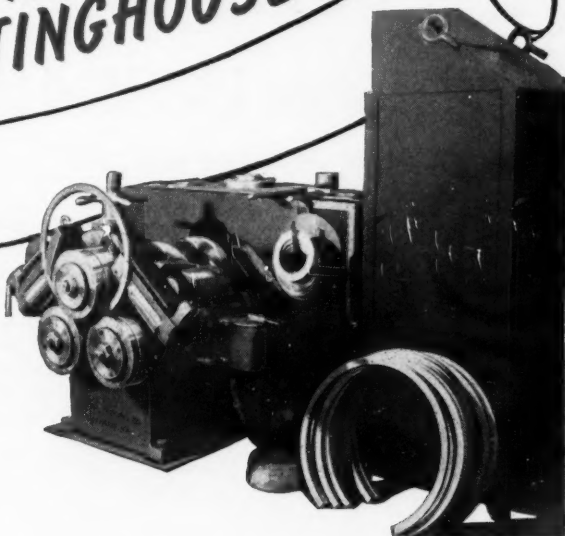


AMES PRECISION MACHINE WORKS
Waltham 54, Mass., U.S.A.

Rolling Up
Production at
WESTINGHOUSE!

THIS *"Buffalo"*
BENDING ROLL

*Produces Rings
with Accuracy
and Speed!*

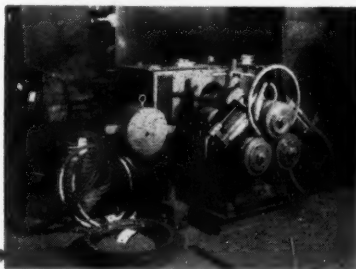


• Above, the "Buffalo" No. 1 Bending Roll at the Buffalo Division of Westinghouse Electric Corporation, bends a 1" x 1/2" flat on edge to make an accurately formed ring for a Westinghouse motor. In plants by the hundreds, "Buffalo" Bending Rolls are recognized as the quickest, easiest and most economical way of producing arcs, circles and spirals from: (1) Angles, leg-in; (2) angles, leg-out; (3) beams; (4) channels; (5) flats; (6) rounds; (7) squares; (8) tubing and pipe. For facts on "Buffalo" Aircraft type Benders, write for Bulletin 3344-B. For the heavier horizontal and vertical benders, write for Bulletin 352-C.

ALL IN A MORNING'S WORK

is this group of rings at the Westinghouse plant.

Note how close the ends are brought together for the welder. This is a vertical model "Buffalo" Bending Roll.



BUFFALO *"Buffalo"* FORGE COMPANY

388 Broadway

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

PUNCHING

CUTTING

SHEARING

BENDING

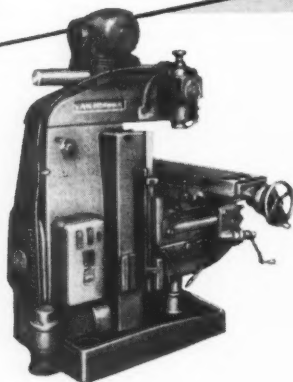
VAN NORMAN

Reduce Idle Machine Time...

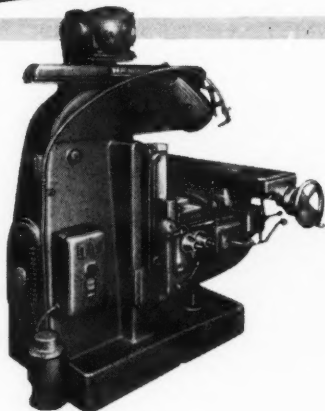
There's A Size To Meet Your Exact Requirements

Manufacturers in all types of industries step up milling production, minimize errors and cut costs per man and machine-hour with Van Norman Ram Type Millers. These versatile millers enable you to perform any and every milling job from horizontal to vertical... simply by positioning the adjustable cutterhead. This means *one* machine gives you the work range of several types of single purpose millers. In addition, Van Norman Ram Type Millers

save time because most jobs can be carried through to completion without changing the work set-up. See for yourself how these machines cut costs, improve accuracy and increase production in the tool room, machine shop, laboratory and pattern shop. Their adaptability makes them ideal for maintenance and repair work. They are available in a wide range of sizes... for every milling requirement. Write for information.



Model No. 22L
Table size: 45" x 10"

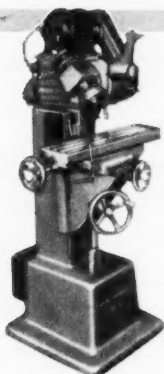


Model No. 26
Table size: 58" x 13"

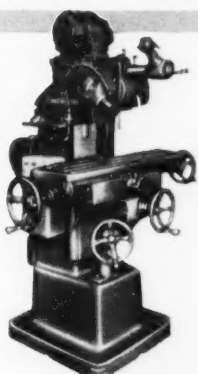
VAN NORMAN COMPANY

Ram Type Millers

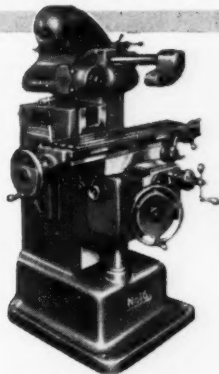
Cut Costs on All Types of Milling



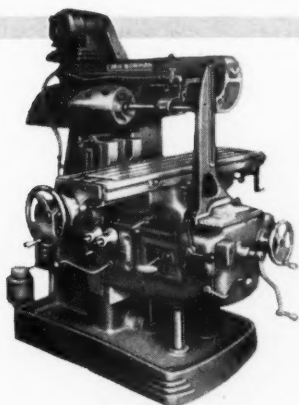
Model No. 6
Table size: 30" x 6 $\frac{1}{2}$ "



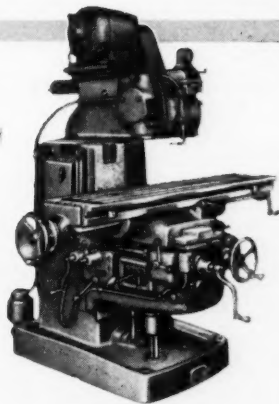
Model No. 12
Table size: 37 $\frac{1}{2}$ " x 9 $\frac{3}{8}$ "



Model No. 16
Table size: 37" x 9 $\frac{1}{2}$ "



Model No. 36
Table size: 64" x 14"



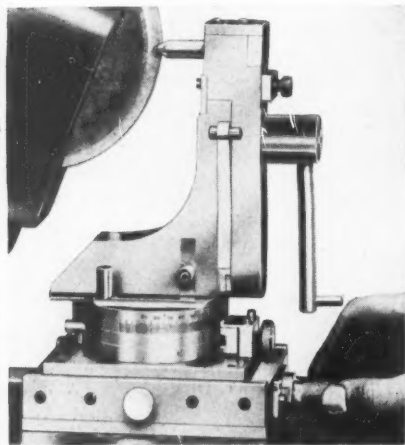
Model No. 38
Table size: 64" x 14"



SPRINGFIELD 7, MASSACHUSETTS

.0001 Accuracy Faster Form - Dressing with J & S "Fluidmotion"* Radii and Angle Dressers

DELIVERY FOR MAY — 2-3 WEEKS — F.O.B. EAST ORANGE, N. J.



**MODEL "C" "Fluidmotion" Dresser up
to 14" Wheel**

**Dress Two Angles Tangent to a Radius
in one continuous Motion.**

The Dresser with a 1" travel micrometer feed.

For use in repetitive precision production, where extremely precise depth of radii and simplicity of operation are required. Lead-screw handle graduated to .001" — moves Dresser forward, backward with sensitive range of full inch.

"Fluidmotion" is the simplest, most accurate method for form-dressing. It allows dressing the entire angle-radius-angle wheel profile on surface and cylindrical grinders **in one continuous motion**—with one easy setting. A clean, precise form results, with no tool or chatter marks. Angles and curves flow into each other.

Highly skilled operators and elaborate set-ups are **unnecessary. Beginners quickly learn** to turn out contours **accurate to .0001".**

Features: Automatic centering, dustproof and chatterless, high-carbon, high-chrome construction—easily adaptable to all surface and cylindrical grinders, with J & S fixtures.

J & S "FORM-MASTER" ANGLE and RADIUS DRESSER—less expensive—dresses both angles and radius.

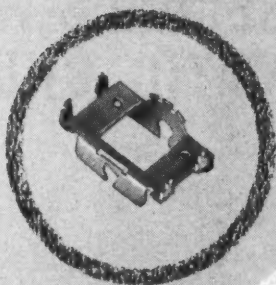
NOW AVAILABLE—WHEEL DRESSERS TO DRESS 36" DIAMETER WHEELS ON CYLINDRICAL GRINDERS.
***REG. U.S. PATENT OFFICE.**

Write for Further Information

OTHER J & S TIME SAVERS:

**J & S "ALL PURPOSE" JAW CLAMPS.
SPECIAL PURPOSE FORM TOOLS OF
SOLID CARBIDE or HIGH SPEED STEEL**

J & S TOOL CO., INC.
475 Main St., East Orange, N. J.
Representatives in Principal Cities



interchangeable punches

... made it possible for one die to do the work of three in stamping this switch bracket for use in a 2, 3 or 4 position rotary slide switch. But the interchangeable punches made extra precise die work and accurate closure a must. That's why ...

they built the die in a **DANLY PRECISION DIE SET**

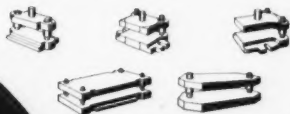
Reliable Danly precision makes every Danly Die Set the finest base for exacting die work. Square and true, they save time in the die shop and assure longer production runs in the press.

That's why diemakers everywhere prefer Danly Die Sets. They're quickly available from a nation-wide system of stocked assembly branches†... just phone for fast delivery.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue Chicago 50, Illinois

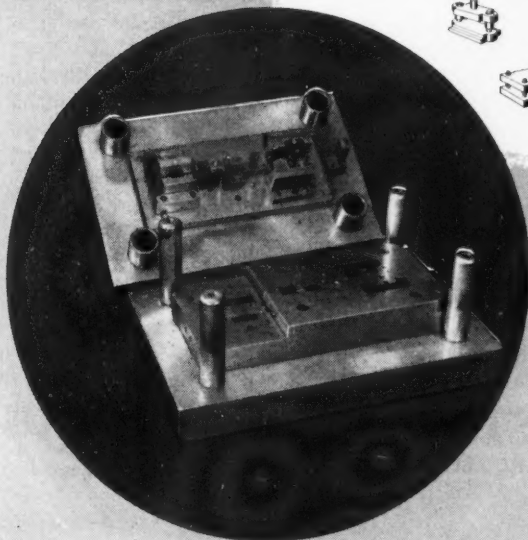
PRECISION DIE SETS... STANDARD AND SPECIAL



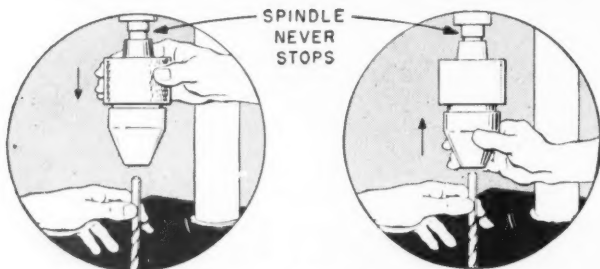
WHICH DANLY BRANCH IS CLOSEST TO YOU!

- *CHICAGO 50, 2100 South Laramie Avenue
- *CLEVELAND 14, 1550 East 33rd Street
- *DAYTON 7, 3196 Delphos Avenue
- *DETROIT 16, 1549 Temple Avenue
- *GRAND RAPIDS, 113 Michigan Street N.W.
- *INDIANAPOLIS 4, 5 West 10th Street
- *LONG ISLAND CITY 1, 47-28 37th Street
- *LOS ANGELES 54, Ducommun Metals & Supply Co.,
4890 South Alameda
- *MILWAUKEE 2, 111 East Wisconsin Avenue
- *PHILADELPHIA 40, 511 W. Courtland St.
- *ROCHESTER 4, 16 Commercial St.

†Indicates complete stock



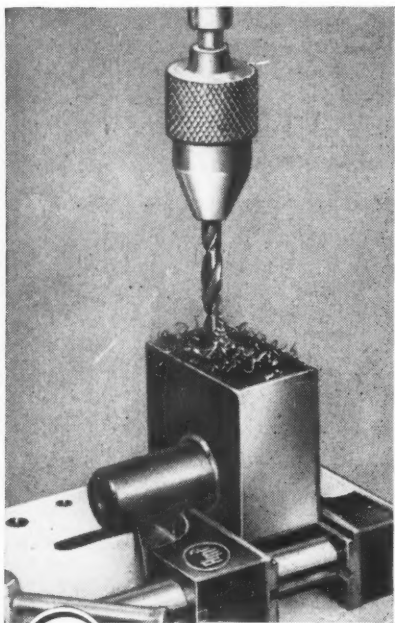
CHANGE TOOLS IN SECONDS WITH THIS FULLY-AUTOMATIC CHUCK



Here's all there is to changing tools:

1. Grip sleeve—pull down—jaws open automatically—tool is released.

2. Insert new tool—push up tapered part—tool is locked in place.



Save *time*—no more hunting for keys, collets or wrenches. Save *tools*—smooth, hardened and ground jaws grip tight without chewing into tools. Automatically self-centering...grip increases with load. Save *money*—one spindle does the work of several. For uninterrupted, precision drilling get Wahlstrom—the only fully-automatic chuck...also used for spotting, drilling and reaming in boring or milling machines. They will also save money in lathe work for burring, turning, filing. Holds two ranges of straight shank tools: from 1/64" to 3/8"; and from 1/32" to 1/2".

For further information see your local industrial supply distributor or write: *Wahlstrom—Float-Lock Sales Dept., American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y.*



WAHLSTROM FULLY-AUTOMATIC **CHUCKS**
NO KEYS, COLLETS OR WRENCHES

Two Beauties



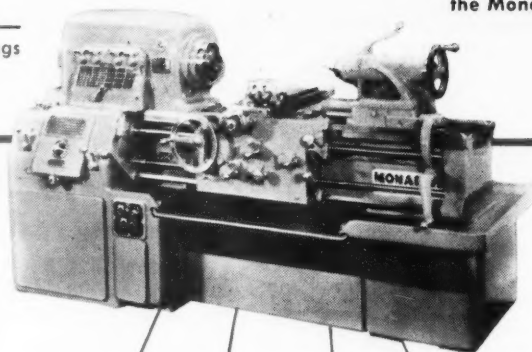
**Write for
Descriptive
Folder**

Shown here is the new model "A-5" PEDRICK BENDING MACHINE. The 540 pounds one piece cast base replaces the four leg design, thus insuring rigidity. The power packed "A-5" will bend 2" extra heavy pipe, 1 1/4" square and 1 1/2" round solid bar stock, tubes, structural shapes, etc. Equipped with 5 H.P. motor gearhead drive and controls for automatic duplicate bending, the "A-5" still sells for only \$1975.00 U.S. Funds, FOB factory.

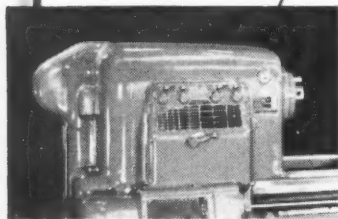
PEDRICK TOOL and MACHINE CO.
3640 N. LAWRENCE ST. DEPT. 5 PHILADELPHIA 40, PA.

here's the basic design—
in 13", 16" and 20" swings

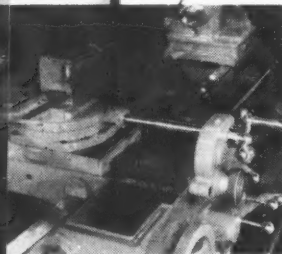
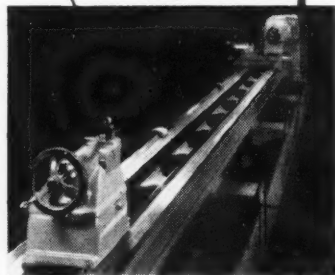
the Monarch series 60 lathe



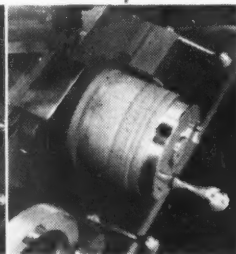
standard variation #1
series 60 plus-
swing models



standard variation #2
series 60-
long bed models



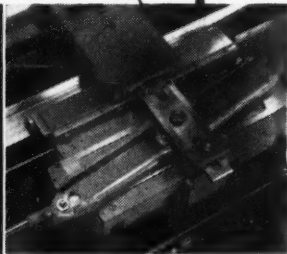
ball turning rest



micro-gage dial



spindle nose chucks
and collets



anti-friction bearing
taper attachment

AND HERE ARE TYPICAL MONARCH SERIES 60 ACCESSORIES

HERE'S YOUR IDEA ORGANIZATION CHART for Small Lot Production and Maintenance

This, of course, gives you only a partial idea of the great versatility of the Monarch Series 60—available both as an Engine and a Toolmaker's Lathe. But it does indicate the ease with which the competent basic model can be customized to meet your requirements beyond those served by our standard design. It doesn't show *all* the accessories—the real inside story of Monarch specifications and construction—or the Monarch Heavy Duty Line with added power and swing. For the whole story, you'll want the illustrated, detailed Booklets that we have prepared. Just fill in the handy coupon, indicating your special interests . . . *The Monarch Machine Tool Company, Sidney, Ohio.*



FOR A GOOD TURN FASTER . . . TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO

Gentlemen: Please send me without obligation the following Complete Booklets.

- ☐ Booklet No. 1113—Monarch Series 60 Lathes
☐ Booklet No. 1208—Monarch Heavy Duty Lathes

NAME _____ TITLE _____

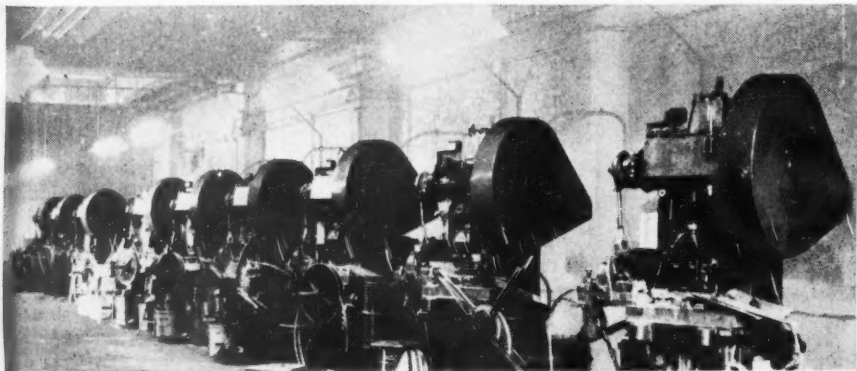
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ADDRESS _____

CITY _____ ZONE _____ STATE _____

**"EXTREMELY
EFFICIENT..."**

**PRESS-RITE
POWER
PRESSES**



Nine of Alcon's 30-Ton Press-Rites.

ALCON METAL PRODUCTS, INC., manufacturers of radio and electronic components at Chicago, Illinois, have a battery of 11 30-ton Press-Rites in operation.

Says Mr. C. P. DeVito, Vice-President and General Manager: "We are using our Press-Rites to stamp brass and steel terminals used in radio, television and electronic components. Processes performed include drawing, perforating, forming and blanking. By the use of progressive dies and automatic roll feeds, we are producing up to 600 pieces per minute per press. We have found our Press-Rites extremely efficient and are well pleased with their performance. Due to their oiling system, they require very little maintenance."

Alcon's experience of yesterday and today, can be yours of tomorrow. Specify Press-Rite Power Presses for your production line! Write for Bulletin P-650, TODAY!

**8 MODELS
CAPACITIES
5 TO 85 TONS**

Sales Service Machine Tool Co.



2365 UNIVERSITY AVENUE
ST. PAUL 14, MINNESOTA

SHEET & PLATE FABRICATION

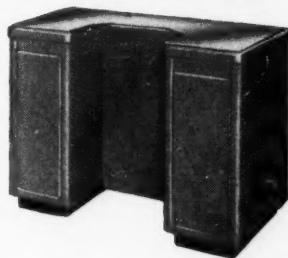
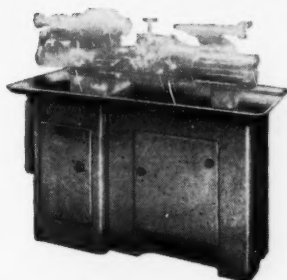
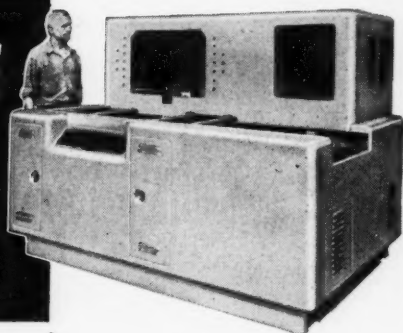
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Machine Bases

If you need welded machine bases, pedestals, frames or other fabricated items for your production, call on Kirk & Blum. Complete facilities through $\frac{3}{8}$ " capacity for all types of fabrications.

Whether it's 1, 100 or 1000 units, Kirk & Blum can produce them promptly and economically.

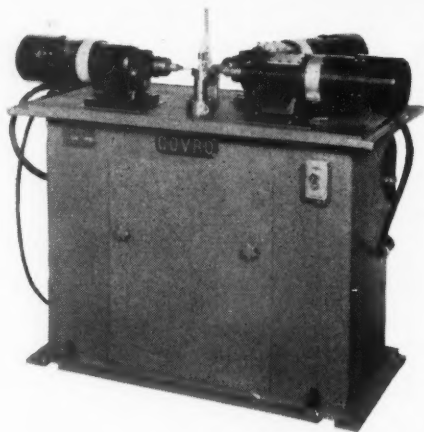
Modern equipment, in a new, large plant, together with a skilled organization with 45 years' experience assures you of complete satisfaction. For a prompt quotation, send prints to The Kirk & Blum Mfg. Co., 3203 Forrer St., Cincinnati 9, Ohio.



Drive Guards • Louvre Panels
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KIRK AND BLUM

METAL FABRICATION



Reaming Two .0709" Holes and Tapping One No. 00-96 Hole Simultaneously

Small brass discs are first run through a Govro-Nelson drilling machine similar to the one illustrated, two holes being drilled, and a third hole drilled and counter-bored with a combination tool for the tap.

The part is then run through the machine illustrated which incorporates two Govro-Nelson Automatic Drilling Units to ream the previously drilled holes—also one Govro-Nelson Tapping Unit to tap the #00-96 hole, all done simultaneously. The output of each machine is at the rate of 10 pieces per minute.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

WRITE FOR
Literature

GOVRO-NELSON CO.

Machinists of Precision Parts for 28 Years

1933 Antoinette
Detroit 8, Mich.

Automatic **DRILLING UNIT**

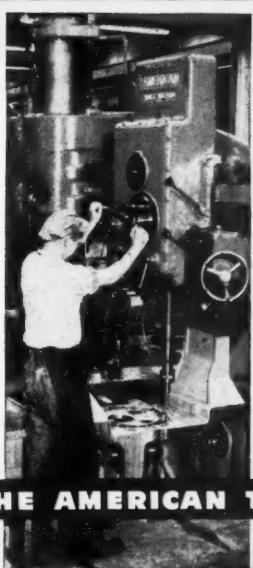


"CATERPILLAR"

"American"

A coalition of outstanding
"name" products dedicated
to the interests of industry.

Here is a "Caterpillar" Diesel DW20 Tractor with
W20 Wagon loading heavy clay for the Garza-Little
Evin Dam near Lewisville, Texas.



The astonishing ease of operation of these units due
to their ultra-modern design makes the "load"
lighter and the cost lower.

For the very same reason "Caterpillar" uses many
"American" Radials. Because of their ultra-modern
design they make the drilling, boring and tapping
"load" lighter in "Caterpillar" plants and keep the
cost of production at a minimum.

Extra power, centralized control, boring mill type
spindle and extra fast tapping are outstanding virtues
of "American" Hole Wizard Radials which swell the
operator's pay envelope and help keep production
on a profitable plane.

For more work, better work and lower cost work, get
the facts about "AMERICAN".

Bulletin No. 327 upon request.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

3 More Screw Machine Records!

PRODUCTION INCREASED 79.4%

Part #1 .125 x 2 3/4" round steel rod. Turn neck, knurl, cut off. 540 pieces per hour with conventional feed . . . 969 pieces per hour with Lipe AML Bar Feed.

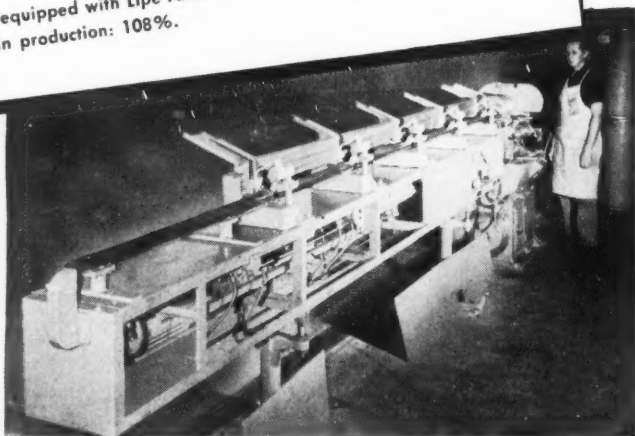
PRODUCTION INCREASED 50.9%

Part #2 3/16 x 3" brass tube, 1/32" wall. Inside chamfer one end, square cut-off. Previous production 560 pieces per hour . . . 845 pieces per hour with Lipe AML Bar Feed.

PRODUCTION INCREASED 108%

Part #3 1/32 x 16 1/4" steel rod. Form ends and chamfer. One of 14 different jobs on No. 00 B&S Screw Machine equipped with Lipe AML Bar Feed. Average gain in running time: 78%. Average gain in production: 108%.

LIPE AUTOMATIC *Magazine Loading* BAR FEED



Big Production gains on a wide variety of jobs because:

- Stock is fed to screw machine all the time — not dependent on operator.
- Feed-out pressure always behind stock.
- Eliminates feed fingers.
- Avoids multiple feed finger feed-outs.
- Gives maximum output of machine no "cutting air."
- Saves in changeover set-up time.

GUARANTEE

Lipe Automatic Magazine Loading Bar Feed will enable a screw machine to produce at least 90% of its gross production capacity.

Get full details on how a Lipe AML Bar Feed will increase your production and save money. Our engineers will gladly study your problem — no obligation. Write.



Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.



18" HEAVY DUTY DRILL PRESS

**With 6 "Bonus" Features
For Better All-Around
Heavy Duty Drilling**

- ★ 6½" Spindle Travel
- ★ 39" Max. Distance Spindle to Table
- ★ 6¾" Spindle—Nose, No. 3 MT
- ★ Head and Table Positioning Mechanism
- ★ Vernier Depth Stop Control
- ★ Ball Bearing Drive

Get these important new drilling advantages with a Clausing 18" Drill Press. The 6½" spindle travel gives bigger job capacity, permits better use of production chucks. Drilling capacity: ¾" in steel, 1" in cast iron. There's 6" to 13" *more* capacity from spindle to table. Spindle is bigger, stronger—handles larger tools. Exclusive vernier control provides .001" depth accuracy. Positioning mechanism saves set-up time—moves *both* head and table. Massive construction, precision-machining throughout, and the smoothness of 5 ball bearing races insure exacting accuracy on every operation. Contact your Clausing distributor, or write for catalog.

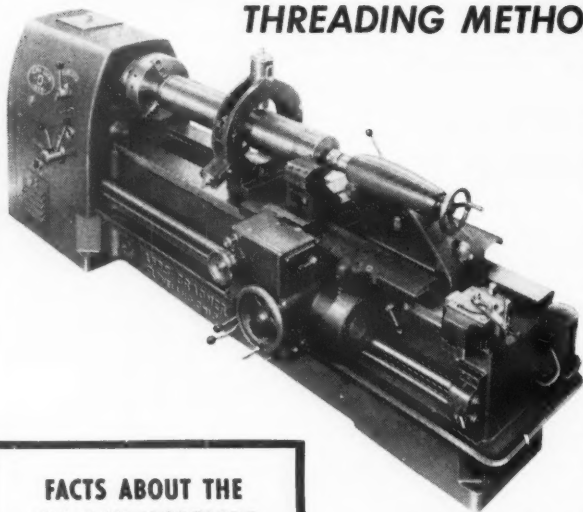


Precision Ground 13" x 18"
Oil Table, 12" x 14" Base

CLAUSING DIVISION

ATLAS PRESS CO., 446 NORTH PITCHER STREET, KALAMAZOO, MICH.

still using "OLD FASHIONED"
THREADING METHODS?



FACTS ABOUT THE CRI-DAN MODEL "D"

SPECIFICATIONS

Motor requirements	15 HP
Spindle speed (24 speeds), 100-1200 RPM	
Swing over saddle	12"
Swing over bed	21"
Capacity between centers	60"
Maximum length of thread	5 1/4"
Max. exter. diam. of thread	12"
Max. inter. diam. of thread	16"
Maximum depth of thread250
Multi-start threads	Up to 12 starts
Taper threads	30° incl. angle
Length of machine	12'0"
Width of machine	3'7"
Height of machine	4'6"
Approx. weight of standard machine	6900 lbs.

Learn about the New CRI-DAN "D" —the largest of the CRI-DANS

The CRI-DAN "D" is the newly introduced "big brother" to the CRI-DAN "B" which has been setting new records in threading economy and accuracy.

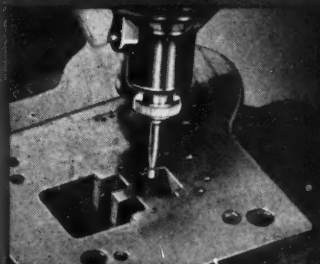
The CRI-DAN'S remarkable economy is accomplished by reduced threading time, the use of a single point carbide tool and fast changeover.

Get the whole story on CRI-DAN. Contact your nearest Lees-Bradner Representative.

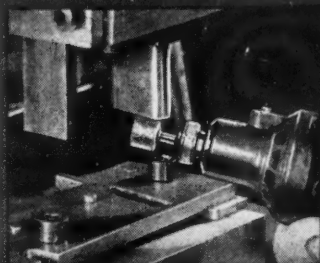
the **LEES-BRADNER**
CLEVELAND 11, OHIO, U. S. A. *Company*



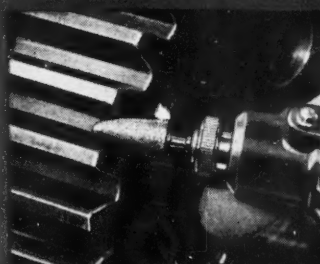
MARKING PARTS



GRINDING DIES



SHARPENING MACHINE TOOLS



BURRING MACHINE PARTS

**PAYS FOR ITSELF ON
"HARD-TO-GET-AT" JOBS**

DREMEL

Electric

MOTO-TOOL



**Approximately
27,000 R.P.M.**

Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty mid-gels helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, *without tearing down "set-ups."* Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibration-less operation.



**MOTO - TOOL KIT
NO. 2** contains 23 accessories, including high-speed steel cutters and Model 2 Moto-Tool in natural finish hardwood case **\$23.50**

MOTO - TOOL NO. 2, with one emery wheel point **\$16.50**

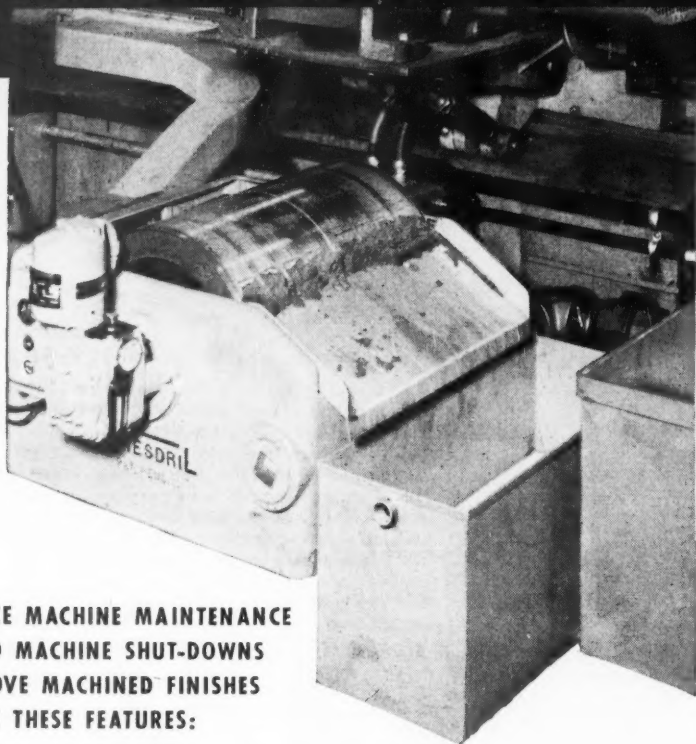
Dremel HIGH - SPEED STEEL CUTTERS and balanced wheel points are available for all makes of hand grinding tools.

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DREMEL MFG. CO. Dept. 222-D **RACINE, WIS. U.S.A.**

BARNESDRIL MAGNETIC COOLANT SEPARATOR
OFFERS SIMPLE, POSITIVE COOLANT CONDITIONING
For Production and Machine Savings!



REDUCE MACHINE MAINTENANCE
AVOID MACHINE SHUT-DOWNS
IMPROVE MACHINED FINISHES
CHECK THESE FEATURES:

Permanent ALNICO Magnets Insure Infinite Life
Extra Long Magnetic Field Overcomes
Viscosity Resistance On Small Particles
Coolant Flow Directed Through 27½"
Concentrated Magnetic Field
Counter Rotation of Magnetic Drum Removes
Non-Metallic Particles
Interlocked Magnetic Field Assures
Consistent Magnetic Attraction

Write for Bulletin 352
for Latest Information on
Barnesdril Magnetic
Coolant Separators.

BARNES DRILL CO.

340 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

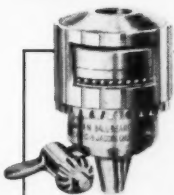


EXTRA POWER for top performance

In A Jet Plane, rockets supply the extra launching power needed for fast-climbing takeoff. In industry, Jacobs Plain Bearing Chucks supply the extra gripping power vital to top performance in light- and medium-duty drilling. This, plus rugged construction and precision accuracy, makes them the world's most widely used chucks.

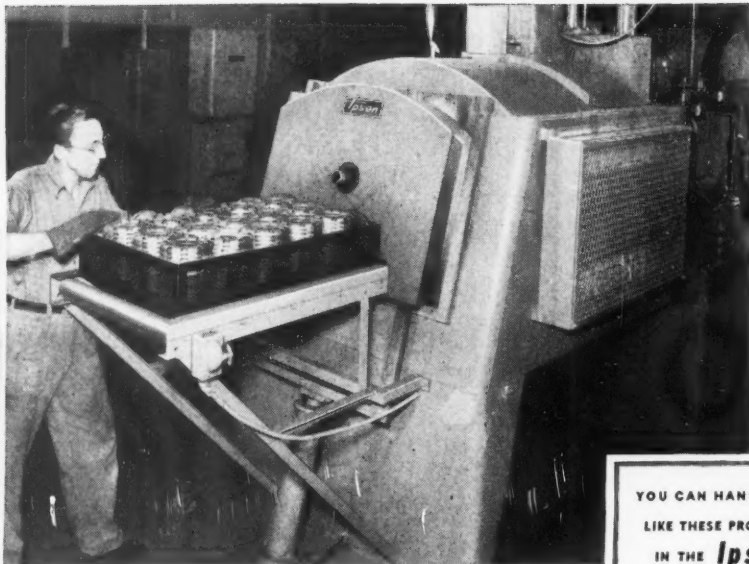
Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.



The Jacobs Ball Bearing Super Chuck, designed particularly for heavy-duty drilling, has the most powerful grip ever developed in drill chuck history.

IF IT'S A
JACOBS
IT HOLDS



Ipsen 250
carbonitriding
SAE 1010
Clutch Retainer
Plates to
C.D. of .004".
Completes 235
pieces in 70
minutes.

4 Important Production Advantages with New **Ipsen** HEAT TREATING UNIT

Designed for carbonitriding, carburizing, hardening, brazing, and mar-tempering, new Ipsen Automatic Production-Type Heat-Treating Units offer outstanding production and metallurgical advantages in processing a wide variety of workpieces. The features outlined below are essentially the reasons why more than 75 plants in the past two years have selected, and are today using, Ipsen Equipment to speed heat-treating operations and cut costs:

1 AUTOMATIC OPERATION—from heat through quench (or cooling), reduces work handling, eliminates guess work, assures uniform results on a production basis.

2 BRIGHT, CLEAN, SCALE-FREE WORK—with sealed atmosphere control. Eliminates cleaning and processing operations prior to and following heat-treatment, effects substantial savings in production costs.

3 CRACKING AND DISTORTION REDUCED—by controlled quenching with two-speed oil circulation and automatic temperature regulation.

4 FAST, EFFICIENT PROCESSING—versatile and easy to handle variety of work, no idle time for change overs, no danger of burning or marring, quick burn-off. Saves time, increases output.



Write TODAY FOR MORE FACTS... Ask for free bulletins and find out how Ipsen Units can be applied to your work. If you wish, samples of your work will be run, procedures established, and results predetermined without obligation.

IPSEN INDUSTRIES, INC., 721 South Main Street, Rockford, Illinois
Production units for CARBONITRIDING · CARBURIZING · HARDENING · BRAZING · MARTEMpering

YOU CAN HANDLE JOBS

LIKE THESE PROFITABLY

IN THE **Ipsen**



Plier Segment—
C1040 Clean hard-
ened. Finish Grind
eliminated.



Gear—C1020—
carbonitrided.
Cleaning before
plating elimi-
nated.



Valve—C1020
welded to C1045—
stress relieved and
hardened. Retap-
ping operation
eliminated.



Release Lever—
carbonitrided 600
per hour. Blast-
ing eliminated.



Heavy Bull Gear Pinions
SAE 6620—carburi-
zed 39
per hour.



*A new addition
to the **LENOX** family*



ARBOR SCREWS INTO
BODY OF SAW, SECURED
BY TWO DRIVE PINS

TOUGH ALLOY
STEEL BACK

ELECTRIC WELDED
HIGH SPEED
STEEL EDGE

SHATTERPROOF

SEND FOR LENOX HOLE SAW
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IMMEDIATE DELIVERY OF
LENOX HOLE SAWS
FROM OUR LARGE
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LENOX HOLE SAWS

AMERICAN SAW
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MFG. COMPANY
SPRINGFIELD
MASSACHUSETTS

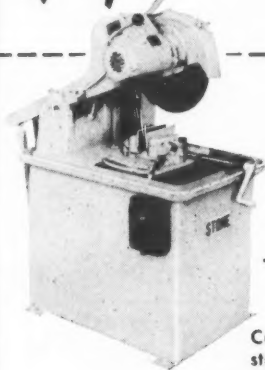
BAND SAW BLADES • HACK SAW BLADES • GROUND FLAT STOCK • HOLE SAWS

STONE

High-Speed

CUTTING MACHINERY

For production cutting of ferrous and non-ferrous metals at the rate of 4 seconds per square inch.

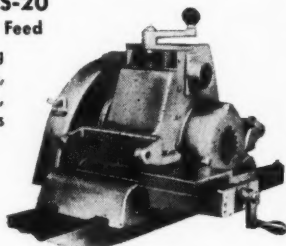


MODEL M-16

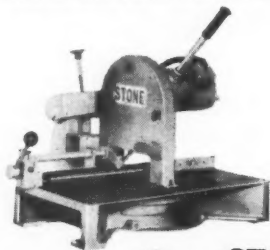
- Floor Model—minimum space required 2½' x 4'.
 - Full 5 h.p. geared-in-head motor engineered with positive drive.
 - Self centering vise mounted on swivel plate permits quick change for cutting any angle to 45°.
- CAPACITY**—Ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be furnished equipped for wet cutting.

MODEL SS-20 with Cross Feed

Cuts wet or dry. For cutting structural steel, armor plate, stainless steel, pipe and rods, non-ferrous sheet, asbestos products.



- Operates on guided rails for cuts up to ten feet in length.
- Develops 10 h.p. with geared-in-head motor engineered with positive drive.
- 8½" raise and lower.
- 8" cross feed travel.
- Rails furnished in 6 feet and 12 feet lengths. Special lengths can be furnished.
- Up to 22" diameter cutting wheel.



MODEL M-14

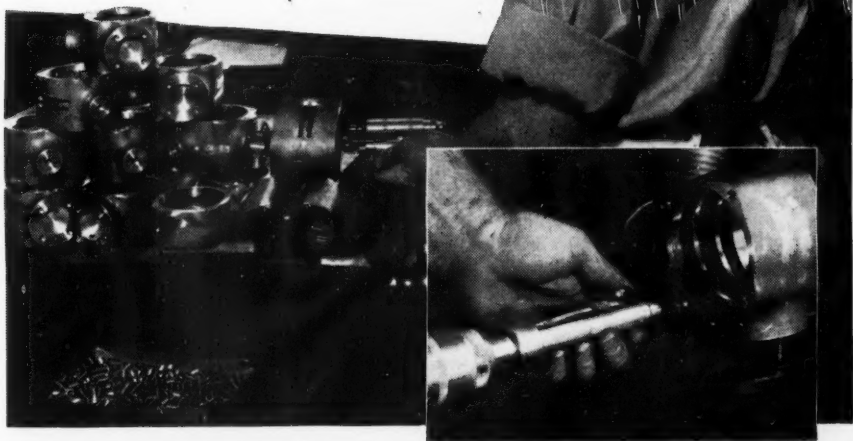
- 32" x 34" bench model.
 - Full 3½ h.p. geared-in-head motor engineered with positive drive.
 - Cutting head swivels up to 45° in either direction for angle cutting on swivel model.
 - Lower priced model available as straight cut-off.
 - Complete set of legs available to convert to floor machines.
- CAPACITY**—Ferrous and non-ferrous solids up to 2"— pipe and structurals up to 2½".

STONE MACHINERY CO., INC.

Fayette St.

Manlius, N. Y.

here's a savings
we KNOW
you can make



Any manufacturer driving Heli-Coil inserts manually — in metals, plastics or ceramics — can reduce the time and cost of this operation as much as 80% . . . we know,

we're doing it every day in our plant!

How? By replacing manual operation with the faster, more efficient operation of a Buckeye air tool. You'll find Buckeye air tools are compact and lightweight, easy to handle in any driving position, and require far less maintenance . . . we know, because we build them!

If you're driving Heli-Coil inserts by hand, we'll be pleased to show you how — and how much — a Buckeye air tool can save on this work . . . then you'll know, too!

Buckeye Tools CORPORATION

DIVISION 17 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada)
Ltd., Galt, Ontario

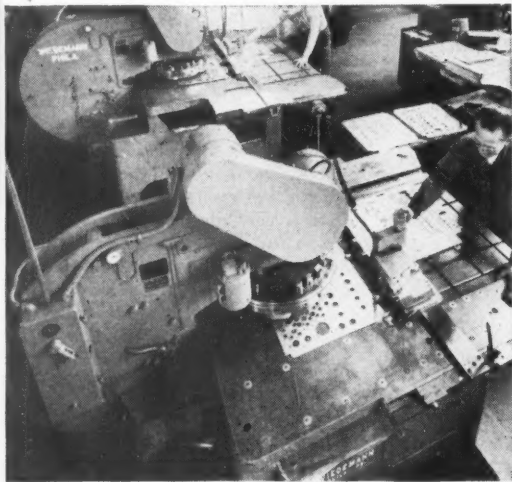
PORTABLE AIR AND ELECTRIC TOOLS FOR INDUSTRY

If you are interested in really reducing piercing costs on short run work, read these facts reported by a Wiedemann RA-41P user:

"We have had one Wiedemann in operation for 13 months and a second for 8 months. During the time these two machines have been in operation they have handled over twenty thousand major electronic chassis with approximately five hundred different perforations and patterns—each pattern having no less than one hundred perforations, and, in many cases, as high as six hundred. The Wiedemann machines have made it possible to do these jobs in approximately one fifth of the time it required previously. In many instances no additional tool cost was incurred. Where additional tooling was required, the cost was less than one hundred dollars a job."

Stone and Smith's production record is typical—manufacturers of such diversified products as road machinery, switchgear, electrical products, aircraft, electronic equipment, ships, kitchen equipment, are making similar savings with Wiedemann Turret Punch Presses—short run piercing at long run low cost.

Your production requirements will be given our thorough attention.



"With our two Wiedemanns,
we pierce major electronic
chassis in about one fifth the
time it required previously

says

N. L. Smith, Vice President

STONE & SMITH, Inc.

Los Angeles, California

WIEDEMANN MACHINE COMPANY

4219 WISSAHICKON AVE.
PHILADELPHIA 32, PA.

Welders
Roofing Cranes
Lifts
Drill Stands
Feeder Machines
Grinders
Electric Hammers
Impact Wrenches
Nibblers
Nut Setters
Polishers
Sanders
Saws
Screw Drivers
Tappers
Valve Refacers
Valve Resizers
Air Tool Kits

FOR EVERY JOB!



From a nidget type $\frac{1}{4}$ " models to heavy production $1\frac{1}{4}$ " machines, there's always the one best drill for the job—a THOR . . . all handle styles, all popular speeds—every tool packing Thor's extra power . . . featuring the light weight and handling ease of Thor's modern design . . .

available with stands and accessories. Call your Thor distributor for a free demonstration—or write for Catalog E-2. Independent Pneumatic Tool Co., Aurora, Ill.

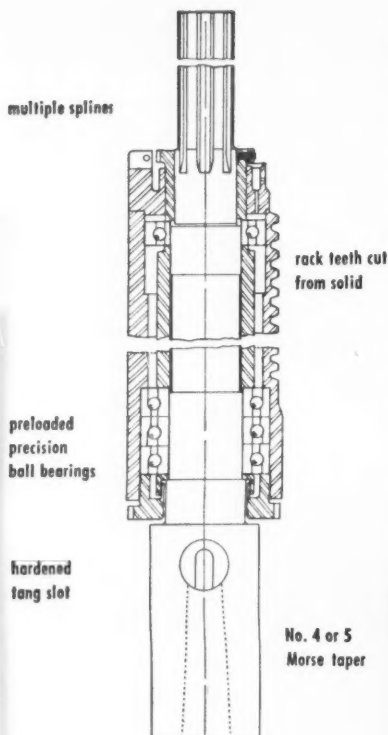


No buyer's file is complete without Thor Catalog E-2.



Thor TOOLS

ASK FOR THE *Silver Line*



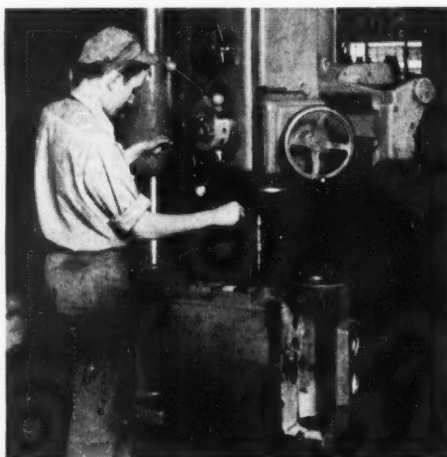
In the photo at the right the operator drills and taps a total of 35 holes, on five faces of the casting, by using a Cincinnati Gilbert Universal Table.

RADIALS
HORIZONTAL BORING MILLS
ACCESSORIES

ACCURATE

Job after job, Cincinnati Gilbert spindles stay right on "O". The $4\frac{1}{4}$ " OD alloy steel quill has a 12" long bearing in the head; spindle is mounted in the quill with three ABEC No. 5 precision, preloaded angular contact ball bearings at the bottom and one at the top. The Gilbert spindle gives maximum accuracy even under strains of improperly sharpened drills, uneven depths of cut, as well as normal thrust load of feeding . . . For sustained accuracy, make your next radial a Cincinnati Gilbert. Write for Bulletin 349.

FLEXIBLE



THE CINCINNATI
GILBERT

MACHINE TOOL COMPANY

3366 BEEKMAN ST. • CINCINNATI 23, OHIO

THOSE WHO BUY GILBERT BUY GILBERT AGAIN

BARNABY FLOATING HOLDERS

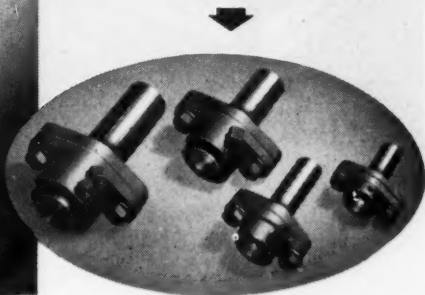


Patent No. 2497426

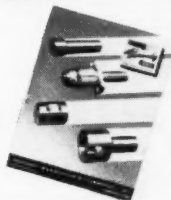
YOU CAN GET IMMEDIATE DELIVERY on these Barnaby Chuck-Type Floating Holders...and assurance of perfect alignment of drills, reamers, counterbores and similar tools. They offer new convenience in setting up automatics and turret lathes, and are particularly valuable on short-run work in cutting tool-change time to a minimum.

These sturdy high-precision tools consist of two parts: (1) the shank, with integral flange; and (2) a similar flange on which the 3-jawed chuck is mounted. Floating construction permits perfect alignment of tools with the work. Available in 7 capacities, with $\frac{5}{8}$ ", $\frac{3}{4}$ " and 1" shank diameter.

◀ **Chuck Type.**
FOR FAST TOOL CHANGE
and
PERFECT TOOL ALIGNMENT
or **Conventional**



These all-steel precision Floating Holders of conventional design are recommended for use where the quick-change feature of the Chuck-Type Holders is not required. Furnished in shank diameters of $\frac{5}{8}$ ", $\frac{3}{4}$ ", 1" and $1\frac{1}{4}$ "



Write for this bulletin which gives full information on these and other Barnaby tools. No obligation, of course.

Barnaby MANUFACTURING CO., INC.
70 KNOWLTON ST., BRIDGEPORT 8, CONN.

Hitch your product to the Star!



good judgment calls for
PARKER-KALON®
when good design calls for
SOCKET SCREWS



Your INDUSTRIAL SUPPLY DISTRIBUTOR—
 your local source for P-K Socket Screws—
 works side by side with the P-K Assembly
 Engineer. Their combined efforts are
 solving many difficult problems of planning
 and procurement. Let them help you.

Put a P-K Ground Thread Socket Set Screw among any comparable set screws. See how its super-smooth, gleaming surface shines out like the brightest star against a midnight sky.

Used in your product, it's a *star* salesman. Any buyer associates topmost quality with Parker-Kalon ground threads.

It's a *star* in your production picture, too. Workers like its clean, burr-free contour, its sure, easy keying, its uniform, dependable Class 3 Tolerance.

Ask for samples. See why P-K Ground Thread Socket Set Screws will put your product out in front, assemblywise and sales-wise. Parker-Kalon Corporation, 200 Varick Street, New York 14.

SIZE-MARKED CAP SCREWS • GROUND THREAD SET SCREWS • FLAT HEAD CAP SCREWS • STRIPPER BOLTS • PIPE PLUGS • HEX KEYS

INDUSTRIAL
PRODUCTS
DIVISION

WESTINGHOUSE
AIR BRAKE COMPANY
WILMERDING, PENNA.

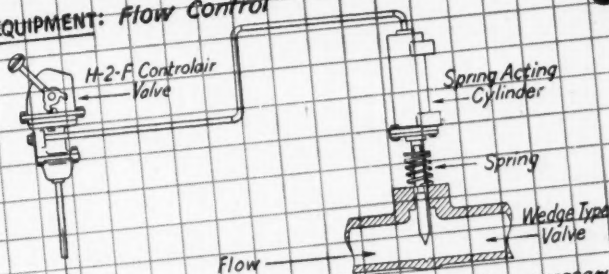


*Ideas for
Engineers*

#6

Data Sheet

EQUIPMENT: Flow Control



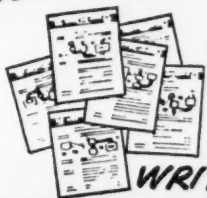
APPLICATION: Accurate control from a remote station necessary to a chemical process to provide positive adjustments in small increments.

SOLUTION: Line equipped with Westinghouse H-2-F Control Air Valve and Westinghouse Single Acting Cylinder (modified by adding external spring).

RESULT: The Control Air Valve, remotely located, provides graduated pressure to spring-opposed cylinder with lifts or lowers valve wedge to change rate of flow as desired. Spring plus force needed to move gate are equal to cylinder force at any setting. This accurate remote control is secured at minimum cost.

Typical of the way AIR Solves the Control Problem!

There are many ways to solve Control Problems with W A B Pneumatic devices. The case above is an example. Our Engineering Data File provides you with the details of this case and many others. Some may apply to your problems.



FREE
THIS
ENGINEERING
DATA FILE

WRITE

INDUSTRIAL
PRODUCTS
DIVISION

WESTINGHOUSE

AIR BRAKE COMPANY
WILMERDING, PENNA.



Factory Branch: EMERYVILLE, CALIF. Distributors throughout the United States . . . Consult your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co., Ltd., Hamilton, Ontario.

★
 IT'S THE INTERNAL
 SMOOTHNESS THAT COUNTS
 IN A CYLINDER... ★

FULMER HONING MACHINES

★
 for fast precision finishing
 of internal cylinders

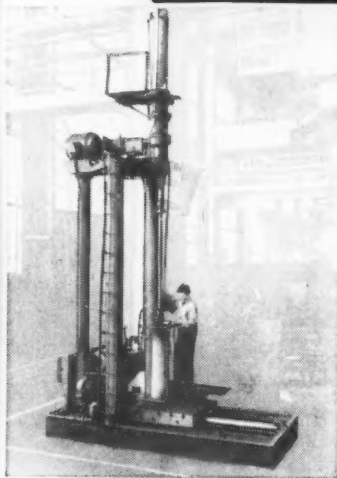


Photo taken in very large steel mill.

STOCK is removed to produce a round and straight bore to the finest degree of accuracy... from 1/2" to 30" internal diameter... finished to tolerances as close as plus or minus .0001 in. All internal roughness is removed from ferrous and non-ferrous metals, glass or plastic cylinders.

For cylinder blocks, connecting rods, blind end cylinders, 4-way valves, etc.



THE CHIPS TELL THE STORY — A multitude chips up to 6 inches long were cut away, showing how fast stock can be removed.

WRITE TODAY for your copy:
 "What To Know About Honing."

C. ALLEN FULMER CO.

1233 FIRST NATIONAL BANK BLDG.

CINCINNATI 2, OHIO

Bridgeport

TURRET MILLING MACHINES

Continue to make other methods obsolete

NO matter how you figure it, today's work cannot be handled economically on yesterday's machines and old fashioned tooling . . . In terms of speed, accuracy, convenience and costs, obsolete methods are a liability . . . never an asset. How are your machines dated . . . '52 . . . '42 . . . '32 . . . or what? Can you mill, drill, bore or shape . . . at all angles of the work . . . without changing set up?

We suggest you investigate the advantages offered by "BRIDGEPORTS" and compare the possibilities with what you are trying to accomplish on existing equipment. Once you've done this, you'll do what countless other shops are doing . . . and replace obsolete machine tools with modern, proved BRIDGEPORT TURRET MILLING MACHINES.

Condensed Specifications

8 Spindle Speeds...from 80 to 2720 RPM.

Back Geared Spindle Drive Unit: utilizes full power at all speeds without belt slip-page.

Power Feed to Quill: 3 steps —.0015, .003 and .006 in. per spindle revolution.

Quill Travel: 5".

Spindle Brake and Lock for convenience in changing tools.

Collet Capacity: up to 3/4" diameter.

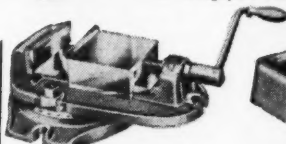


RIGHT ANGLE ATTACHMENTS



(Left) Light Duty
... for right angle milling and drilling narrow, deep molds and cavities.

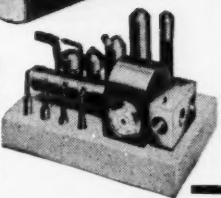
(Left) Heavy Duty
... for milling and drilling at right angles. Fits both Master and 1 HP Bridgeport Heads.



Milling Machine Vise

An improved vise providing great gripping power. Streamlined for attractiveness and equipped with coolant trough. Rigid holding through screw of large diameter. Made in two sizes: 5"x3 1/2" and 6"x5" jaw openings.

No. 2 Boring Head
Boring Tools and Holder provide the means of boring holes up to 6" diameter. Available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.



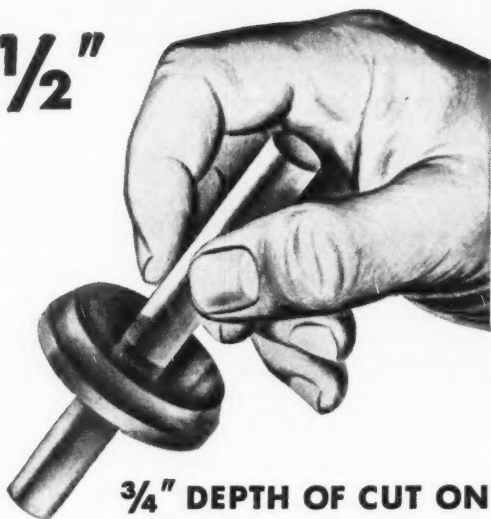
Bridgeport

MACHINES, INC.

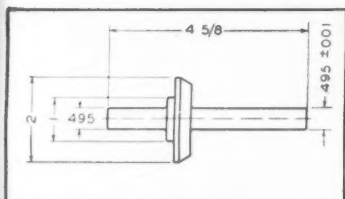
Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

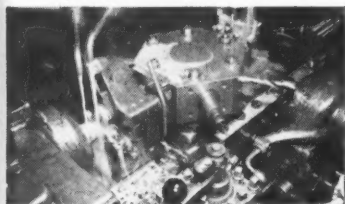
from 2" to 1/2" with **ONE CUT**



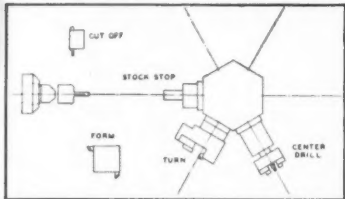
**3/4" DEPTH OF CUT ON
NO. 5 WARNER & SWASEY
HOLDS LIMITS OF ±.001"**



THE PART—Type 410 Stainless Steel Valve made by O. C. Keckley Co.



THE OPERATION—Dia. of 2" bar is reduced to 1/2" in one cut, and .001" limits are held.



THE METHOD—Tooling Setup of the Warner & Swasey No. 5 Turret Lathe that produces this part. Standard Tools are used.

THE O. C. KECKLEY COMPANY, Chicago valve manufacturer, machines the Valve Stem of their Type 410 Stainless Steel Valve, reducing the diameter from 2" to 1/2" with *one* pass of a Warner & Swasey Single Cutter Bar Turner. Spindle speed is 274 RPM, Feed: .012". The limits on this operation are ± .001".

You must have the best in machine tools to turn out jobs like this. Power, alone, is not enough. The machine and tools must be designed to provide maximum rigidity for heavy carbide cuts, as well as to have a surplus of power.

Keckley found out that Warner & Swaseys are the answer to their problem jobs. Why not see what Warner & Swasey Turret Lathes can do for you? Call your nearest Field Representative or write . . .

**WARNER
&
SWASEY**
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

NEW!

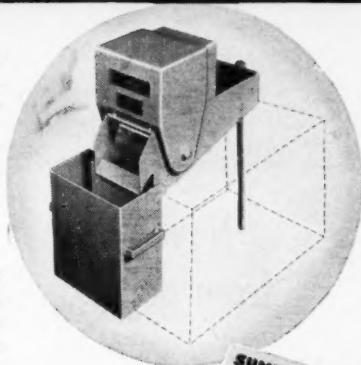
Compact, Efficient Coolant Separator for Grinding, Hon- ing and Gear Shaving Machines



This completely automatic coolant cleaning unit will give you longer wheel or tool life, better finishes, less down time and fewer rejects. The unit requires no attention and little or no maintenance. It does not clog or require shut downs for cleaning or sludge removal.

Easily Installed Without Additional Piping

An important feature of this magnetic coolant separator is that it can be dropped into position on most open type coolant tanks. No additional piping is required. Install one on your present equipment and compare its efficient operation with other units.



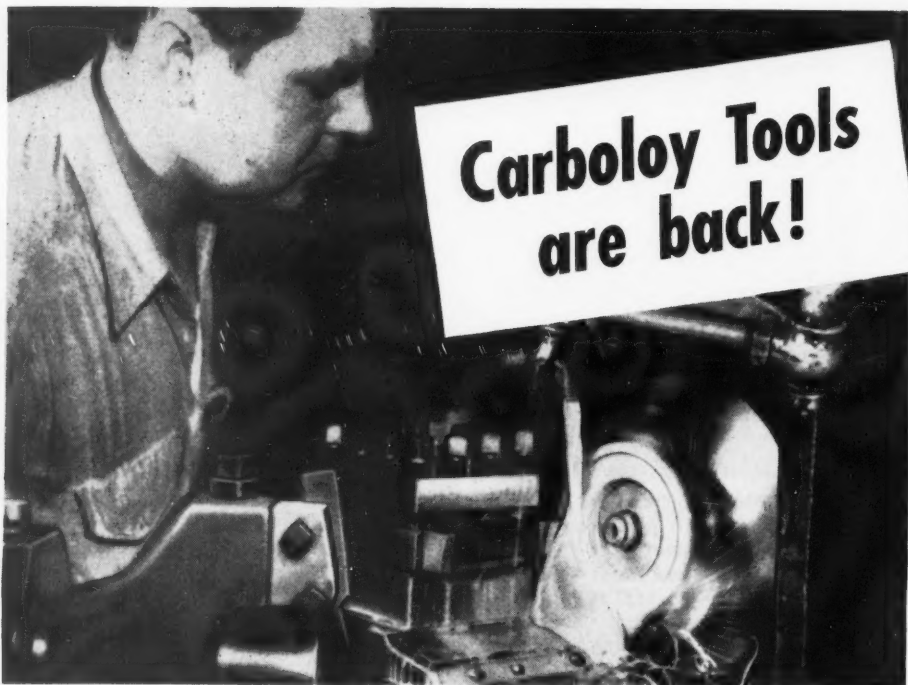
**FREE
ADDITIONAL
DATA**

This folder will give you the complete facts on this new 40 gpm magnetic coolant separator. Write for your copy today. Ask for bulletin 518M.



SUNDSTRAND Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS



Now you get all these benefits again from genuine Carboloy Cemented Carbides

ONCE again production lines are rolling full blast at Carboloy plants. And once again you can start to get *all* the fast-cutting, cost-cutting benefits that Standard Carboloy Tools and Blanks are famous for:

Greater output per tool per hour. Longer tool life. Less downtime and maintenance. Lower costs all down the line from tough, wear-resistant cemented carbides that have no equal in the field.

There's no need to accept substitutes any longer, nor to settle for ordinary carbide performance. With Carboloy "Standards" coming back on distributors' shelves, you can again start to get sensational, proved Carboloy results that add up to *faster, better, more profitable* production in your plant.

NATION-WIDE STOCKS, TOO!

See your Authorized Carboloy Distributor for the 11 great styles of inventory-slashing Standard Tools that can do 80% of your single-point machining jobs. And start stocking up again on the handy Standard Blanks for the "special" jobs, too! As before, blanks are available in hundreds of sizes and shapes . . . easy to braze and grind in your own toolroom to your exact needs for emergency use.

and services!

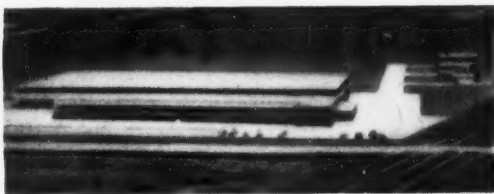
Of course, Carboloy services are *never* in short supply. Get them also! They include engineering field services, in-plant training aids, vast amounts of technical literature on drilling and other subjects, factory engineering and research aid, plus convenient local help from Authorized Carboloy Distributors. In short, they include everything you need to get the superior performance from Carboloy Cemented Carbides that Carboloy metallurgists and quality-control production methods build into them.

See your Authorized Carboloy Distributor or call Carboloy direct.

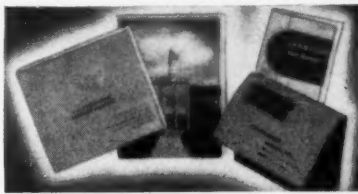


THE LARGEST, most modern cemented carbide plant in the world is back again on full production . . . starting to turn out controlled, high-quality Carboloy Cemented Carbides you can

depend upon for uniformity, matchless performance. The production techniques practiced here at the Carboloy Detroit plant mean better carbide tools at lower cost, too.



AT EDMORE, Michigan, the Carboloy organization has just opened a fine, new plant. It, too, is swinging into production and rushing initial stocks of Standard Carboloy Tools to distributors' shelves for you. Ask for them. Accept no substitutes.



FREE—4 helpful, informative Carboloy items: the Tool Catalog GT-250, CCC Plan Book, the Carboloy Tool Manual, complete kit of carbide data on shell machining (for shell contractors only). They're your guides to more efficient production, so send coupon for them today.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11143 East 8 Mile Street, Detroit 32, Michigan

Clip
and
send
today

CARBOLOY

- ☐ Tool Catalog GT-250
- ☐ CCC Plan Book
- ☐ Carboloy Tool Manual
- ☐ Information about Customer Training School
- ☐ Data on cast iron drilling, deep-hole trepanning and gun drilling with Carboloy Cemented Carbides
- ☐ Complete carbide data on shell machining (for shell contractors only).

Department of General Electric Company
11143 East 8 Mile Street, Detroit 32, Michigan

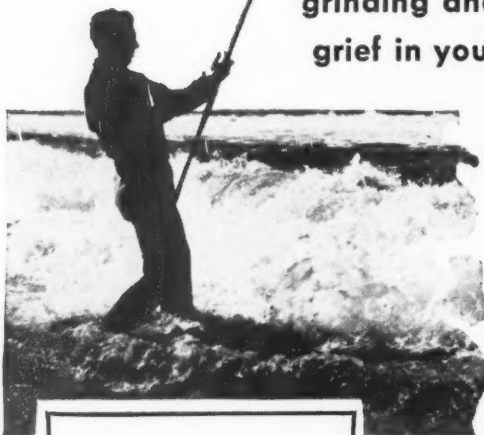
Gentlemen:

Please rush me, without cost or obligation, the items checked at left.

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Surf fishing's

FUN on the sands of the seashore, but . . .

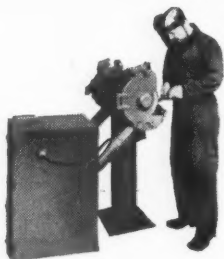


the sands From industrial grinding and polishing means grief in your plant . . .

STOP THEM WITH

TORIT

**DUST
COLLECTORS**



Torit Dust Collectors are available in both cabinet and cyclone types. They range in size from $\frac{1}{2}$ to 5 H.P. and up to 2,100 c.f.m.

When industrial *sands* pollute the air in your plant, your workers think of going fishing. Production lines get snarled with rejects, and the day's *catch* won't be up to the legal limit.

Torit Dust Collectors are compact, self-contained units for capturing and cleaning dust laden air from industrial machines. They are economical to install, efficient in operation and fit easily into present and future production set ups.

Torit Dust Collectors are available in many models and sizes, and special adaptations can be fabricated in our own shops. For complete information and the latest Torit catalog, write:

TORIT MANUFACTURING CO.

296 Walnut Street

St. Paul 2, Minn.

When it
comes to production—
come to
Hartford Special

NEW *Larger Size—
Greater Capacity*

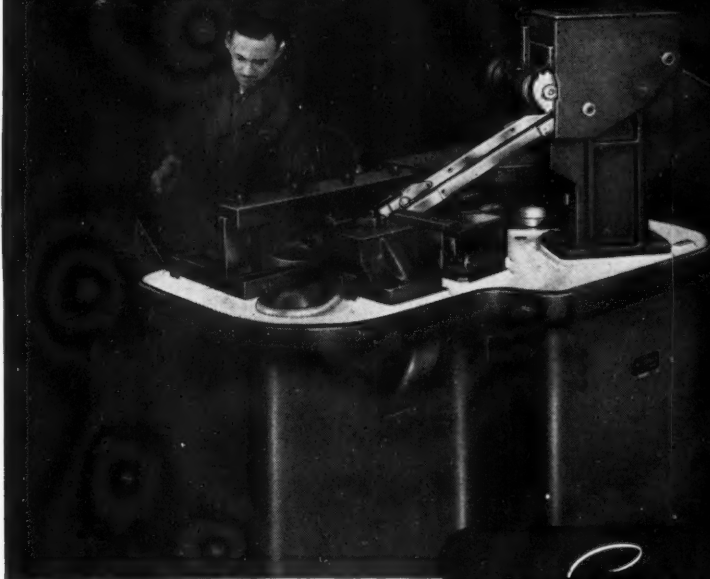
AUTOMATIC THREAD ROLLER

MODEL A-312-H

The Hartford Special Model A-190 Automatic Thread Roller has now been on the market for more than three years. During this time it has met with universal satisfaction from its many users, and this favorable reception and experience by the trade has naturally influenced us to design and develop a larger capacity machine.

NOW HARTFORD SPECIAL ANNOUNCES the new Model A-312 Thread Roller which takes machine screws up to 5/16" diameter by 2 1/2" long at a production rate up to 140 pieces per minute dependent upon screw size.

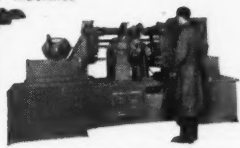
If you roll threads, write for Bulletin TR-312-100.



Hartford Special also makes
these production machines



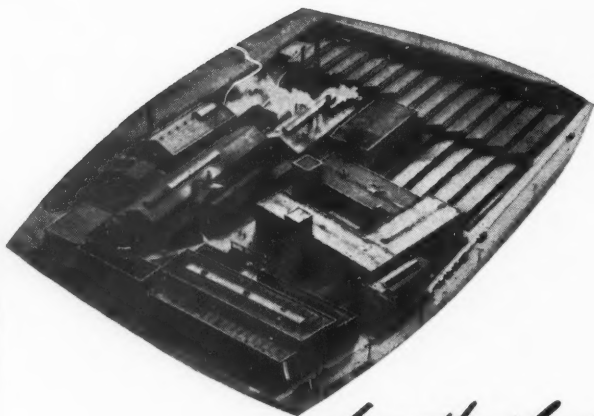
SUPER-SPACERS



AUTOMATIC DRILLING & TAPPING MACHINES

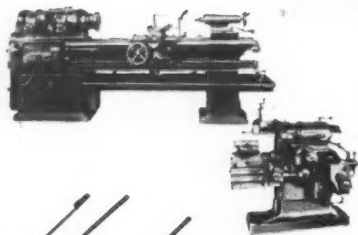
HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 12, CONNECTICUT



...from the plant of precision

No machine tool builder has ever surpassed Henney's reputation for making precision machine tools. This reputation is based on an uncompromising standard established by the founder in 1870. This standard is exactly the same today. Only the method of achieving it has been changed — and constantly will be changed as new and better materials and techniques are developed. By concentrating all its efforts on just engine lathes and shapers, Henney is able to provide the best thinking and the finest results in these fields. Henney products are modern in design, are produced on modern equipment, and are as precise as modern inspection equipment will allow.

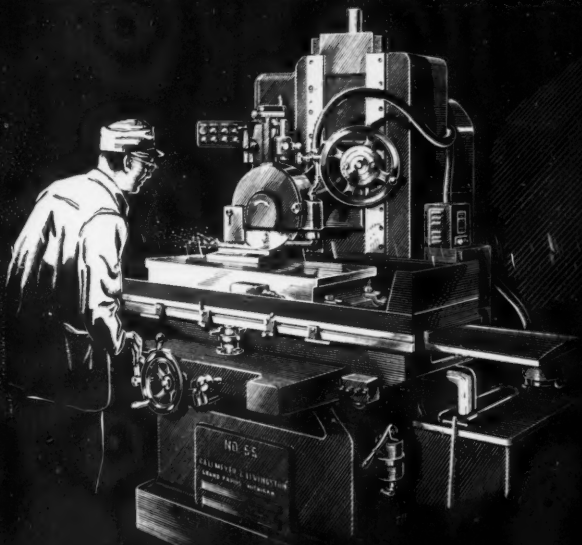


THE HENNEY MACHINE COMPANY
MAIN OFFICE & PLANT: TORRINGTON, CONN.
BRANCH OFFICES: New York, Chicago, Boston, Detroit,
Rochester, Los Angeles, San Francisco
REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh

MODERN **Henney**

precision engine lathes and shapers

WHEN THE DECISION IS PRECISION...



Where extreme tolerances are not required, the choice of any particular grinding machine may not be too important. But, where absolute precision is demanded, the choice is usually *Grand Rapids*.

Defense orders make it impossible to fill orders as quickly as we desire—but we know our customers can appreciate the reasons for delay. As always we'll do our best to serve you.

GALLMEYER & LIVINGSTON CO.

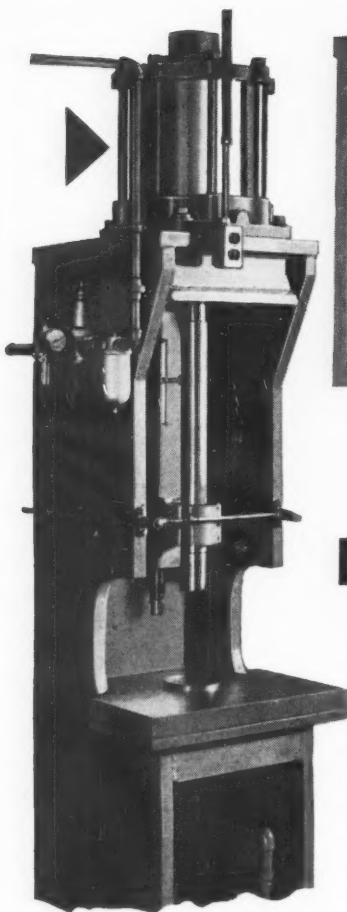
308 Straight Ave., Grand Rapids, Mich.

Grand Rapids Grinders

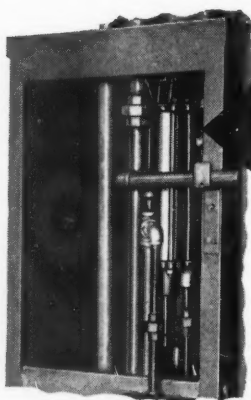
—World's finest



**GALLMEYER
& LIVINGSTON**



NOPAK Model "D" Heavy Duty Cylinder provides power stroke for "squeeze assembly" operation.



NOPAK Model "E" Cylinder supplies clamping or holding power for work-piece.

PRESS MOVEMENTS Powered by NOPAK CYLINDERS

Throughout industry, a variety of vital press movements are powered by NOPAK Cylinders, both air and hydraulic. For example, you'll find them on arbor presses, kick presses, punch presses, drill presses, baling presses, assembling presses, forming presses, power shears, power brakes, clamping devices, and similar equipment. NOPAK Valves control the cylinder movement.

If you build presses, there is probably a NOPAK Cylinder that's *just right* for your needs. Perhaps there are mechanically or manually operated presses in your plant which could be powered by air or hydraulic NOPAK Cylinders, and controlled by NOPAK Valves, to save valuable time, eliminate needless manual effort, speed up production.

GALLAND-HENNING MFG. CO.
2758 S. 31st St. • Milwaukee 46, Wisconsin

Representatives
in Principal Cities

Refer to Sweet's File for
Products Designers or write for
Bulletin SW-1

NOPAK

VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

P 7019-1/2-1



Grinding and finishing welds on a stainless steel tank with a Bayflex Reinforced Disc-Wheel, 9" dia. x 3/16" thick, weight 1 pound.

Formerly this job required a 3½ pound cup wheel for rough grinding plus a sanding disc for finish grinding. This caused operator fatigue and wasteful machine "down-time".

The New Way . . . The Bayflex Way!

Rough grind and finish where required with a single Bayflex disc-wheel in a fraction of the time . . . EASIER . . . SAFER . . . MORE ECONOMICAL.



Bay State Abrasive Products Co.
Westboro, Massachusetts

Branch Offices and Warehouses —
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co.
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Bayflex® Disc-Wheels

CUTTING ACTION

. . . fast and smooth. Has enough resiliency to hug the work. Capable of rough cutting as well as blending.

DURABILITY

. . . outlasts up to 50 (or more) ordinary sanding discs. Withstands a lot of rough usage.

RESILIENCY

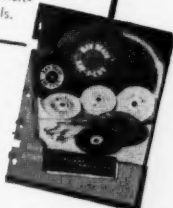
. . . a degree of deflection is possible . . . a great safety factor.

TECHNIQUE OF USE

. . . Apply to work at an angle of approximately 35° using the weight of the machine for pressure. Maintain full speed for most efficient operation.

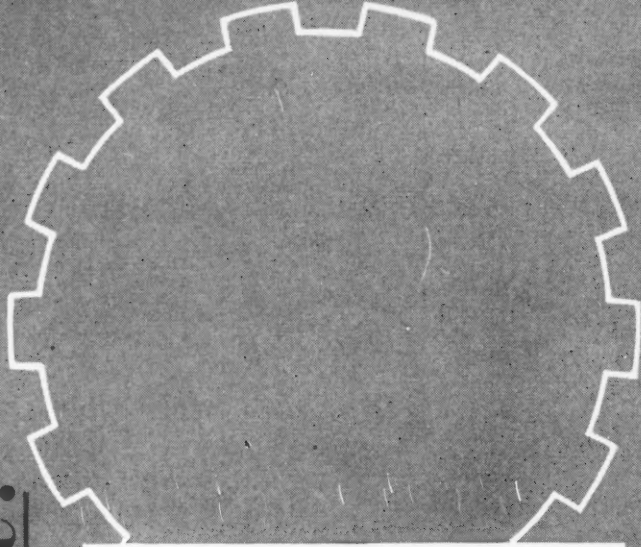
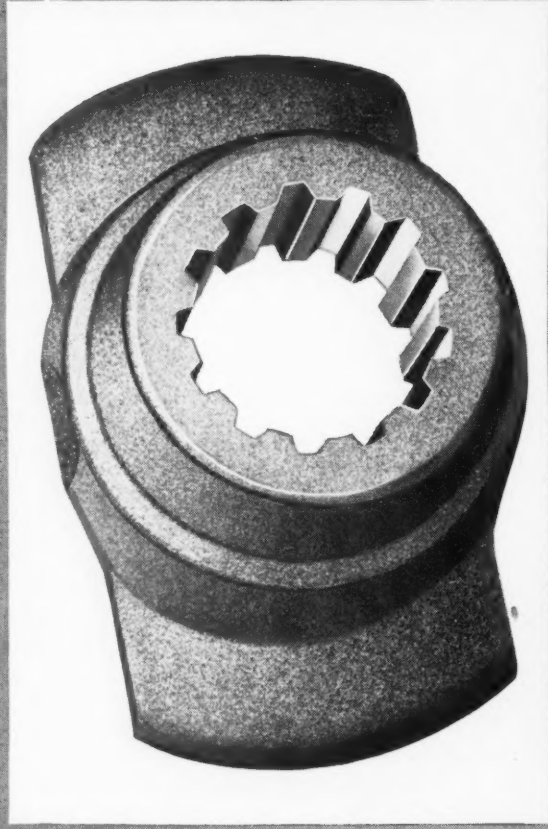
OTHER APPLICATIONS

. . . Weld removal on angle iron, pipe, or other structural steel. Mill scale removal. Chamfering metal preparatory to welding. Smoothing down flame cut edges. Light snagging, deburring, blending and finishing soft, non-ferrous materials.



Send for information-packed "Big Three" catalog. It contains mounting instructions, recommended speeds, charts, applications, etc.

Lower Cost-per-piece:



BROACH REDESIGN cuts tool costs—boosts life

SAVES \$450⁰⁰ MONTHLY

Redesign of the tools for this spline broaching operation resulted in a 24% reduction in original tool cost, 22% increase in the number of sharpenings per tool as well as a 14% increase in the parts produced per sharpening. The result in terms of cost-per-piece was a net saving of \$450.00 per month.

Slight savings in production and sharpening time were effected due to the fact that this redesigned tool was shorter than the original. However, in many cases lowest cost per piece can be achieved only through redesign which increases tool length... a decision which is best made for each application by qualified broach specialists.

This spline operation is but one typical example of how Detroit Broach specialization in broaches and broaching tools pays off. Such specialization provides a back-log of experience which is unparalleled as the basis for sound recommendations. Whether you are considering conversion to broaching or more for your money on present broaching operations, don't fail to consult Detroit Broach. We will be very happy to supply actual cost and production data.

**DETROIT BROACH
CAN CUT YOUR
COST-PER-PIECE**

64

- 1 Developing broaching set-ups to replace other, more costly machining methods.
- 2 Redesign present broaches and broaching set-ups to make them more efficient.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY

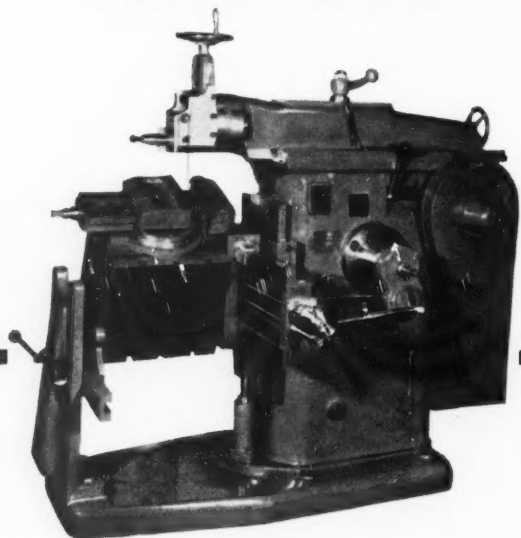
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DETROIT 34, MICH.

"MARZIA"—18"

UNIVERSAL CRANK SHAPER



**MODERN IN DESIGN • REASONABLY PRICED
GOOD DELIVERY**

SPECIFICATIONS:

Ram

Extreme length of stroke..... 18"
Length of Ram 34"
Bearing length in column..... 23"
Thickness of Ram Guides-Vee..... 1½"

Feeds

Range of Feeds..... .0100-.0470

Vise

Width of Jaws 7¾"
Maximum opening 8"

Drive

Type Vee Belt
Current characteristics 220/3/60

Speeds

Number of ram speeds..... 4
Strokes per minute..... 21, 32, 46, 75

Head

Diameter of head 6¾"
Vertical Travel 6"

Table Universal

Horizontal Travel 25½"
Vertical Travel 15½"
Length X Width X Depth..... 13½" x 12" x 12"
Table to Ram—Maximum 15¼"

Weight

Net Weight Approx. 1965 lbs.
Floor Space 70" x 70"

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You'll find your Brighton dealer will make a profitable member of your production team . . . call on him whenever there's a question on socket screws. Write for the name of your nearest Brighton dealer.

Socket Screw Products of All Kinds



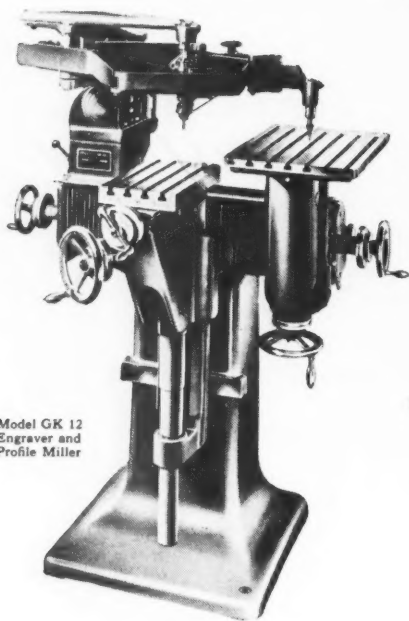
THE **BRIGHTON**
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DECKEL ENGRAVERS and PROFILE MILLERS

for

- Extreme Accuracy
- High Surface Finish
- Economical Production



Model GK 12
Engraver and
Profile Miller

Whether you are engraving small watch cases or profiling dies or molds up to 550 pounds, you can accomplish it with greater precision and speed on the Deckel GK 12 or GK 21 Three Dimensional Pantograph Engraver and Profile Miller.

The sensitive pantograph and adjustable cutter spindle—guided by finger-tip control—assures extreme accuracy in reproduction and excellent surface finish. Reducing or enlarging ratios range from 1:1.5 to 1:10.

These machines are equipped with forming attachments and can be furnished with cylindrical engraving attachments and other work holding devices. A rough milling attachment is available for the Model GK 21.

The GK 12 Miller is fitted with a smaller and lighter pantograph, making it ideal for delicate engraving, light milling and the production of dies for plastic molding or die casting.

The GK 21 Miller has a larger pantograph and heavier cutter spindle assembly to increase the metal cutting capacity; to permit rough milling and to copy mill dies and molds up to 550 lbs.

SEE THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.

Other Deckel Machines for Tooling and Production
UNIVERSAL MILLERS
2 DIMENSIONAL ENGRAVERS
3 DIMENSIONAL ENGRAVERS
UNIVERSAL TOOL & CUTTER GRINDERS

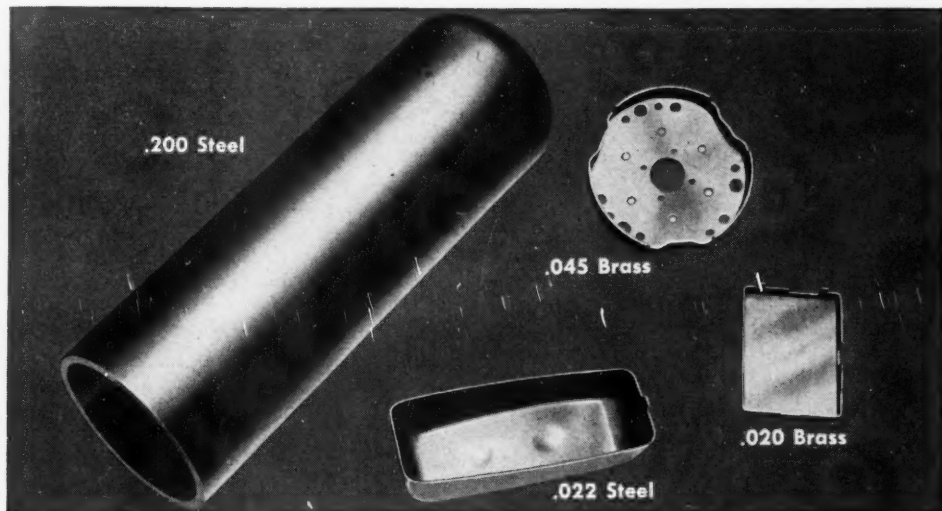
COSA CORPORATION

405 Lexington Ave., New York 17

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Perfect edges, clean, without burrs or distortion at the trimmed edge. Contours can be straight or curved, with single or multiple notches and projections.

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TRIMMING
DIES



THE STEEL PRODUCTS ENGINEERING CO.

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HERE is a new 256 page textbook containing complete information on: theory and use of Gage Blocks, Optical Flats, Monolites, Electric Comparator Gages and related equipment for dimensional measurement; the "reading" of millionths-of-an-inch with light wave interference bands; the need for millionths accuracy; recommended procedures for statistical sampling of parts to reduce rejects and waste. This \$3.50 book is available from your local DoALL Sales-Service Store or The DoALL Company.

2. Understanding the Precision Measuring Equipment



DoALL BLOCKS

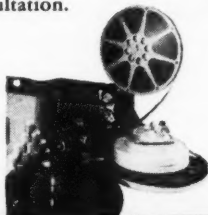
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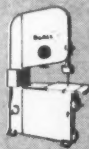


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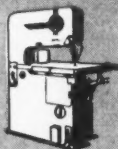
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CONTOUR



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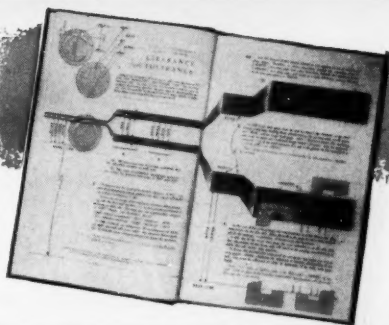
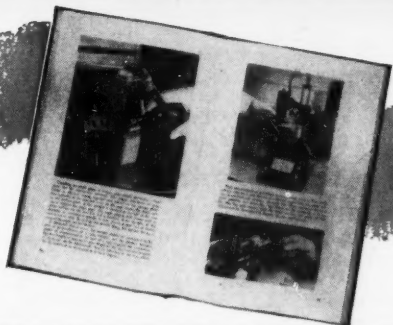


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SAW BANDS

DIMENSIONAL QUALITY CONTROL



DoALL MONOLITE

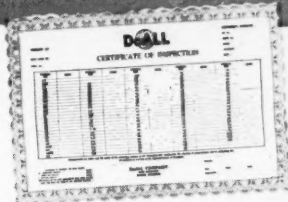
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Highest quality quartz, for "reading" millionths-of-an-inch with light wave interference bands.

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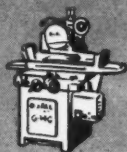
GAGE BLOCK CALIBRATION SERVICE — The accuracy of the finest lineal measurement instruments—Gage Blocks—must be periodically checked against the ultimate constant—a wavelength of light. DoALL offers this service at nominal charge. Ask for details.

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TOOLROOM CABINET



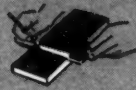
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TOOL KIT

CS-7



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Whether it's milling or drilling, slotting or reaming . . . or perhaps some special operation . . . chances are there's a Reltool Cutter to do the job efficiently. If special cutting tools are needed, Reltool can supply them to your exact specifications. For fine workmanship . . . at low cost . . . rely on Reltool for your metal cutting-tool needs.

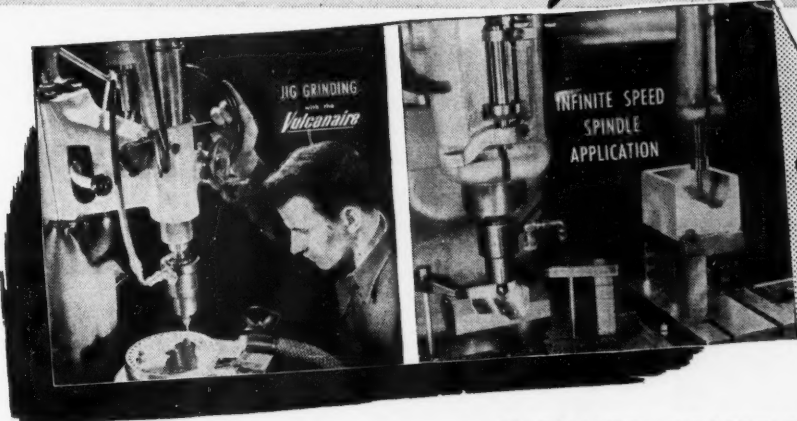
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Reltool CORPORATION
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JIG GRINDING ACCURACY *guaranteed**



INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

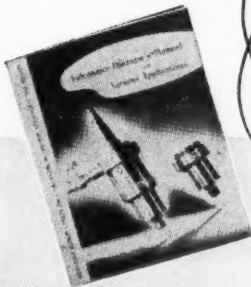
**Dependably accurate to "tenths"*

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 $\frac{3}{4}$ " long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.



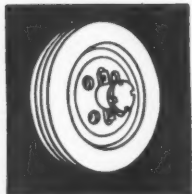
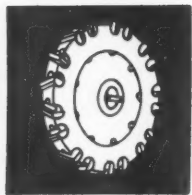
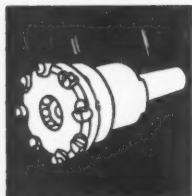
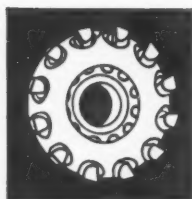
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The modern Lovejoy line of inserted-tooth milling cutters are ordered and reordered on the basis of performance. Proof? . . . our first customers are still with us after 30 years of satisfaction.

The modern Lovejoy line has never been more complete. Improved new designs, both standard and special, are coming constantly from our large engineering staff.

The modern Lovejoy line features the exclusive "positive-locking" device to allow maximum use of each blade and minimum loss in sharpening.

The modern Lovejoy line of milling cutters, boring tools, arbors, flywheels, etc., plus outstanding field service, can help you cut your production costs, just as it has for others.

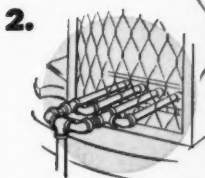
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LOVEJOY
TOOL COMPANY, INC.

Give Two Ejection Problems the Air ...and boost production and safety



1.



2.

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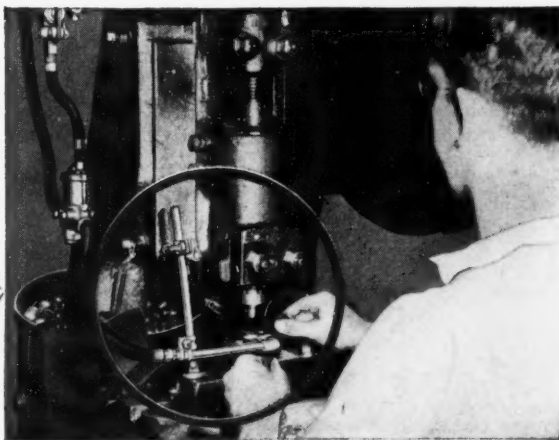
Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

① End dangerous hand removal of work with Schrader Air Ejection. Install Schrader Air Ejection Sets on your power presses. Production soars—up to 100% ... operator safety is boosted 50%. Replace hand removal with Schrader Air Ejection and watch your presses take a new lease on life.

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Schrader Air Ejection Sets are delivered fully assembled, ready to go to work. Their cost is more than repaid in a few weeks.

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control the air

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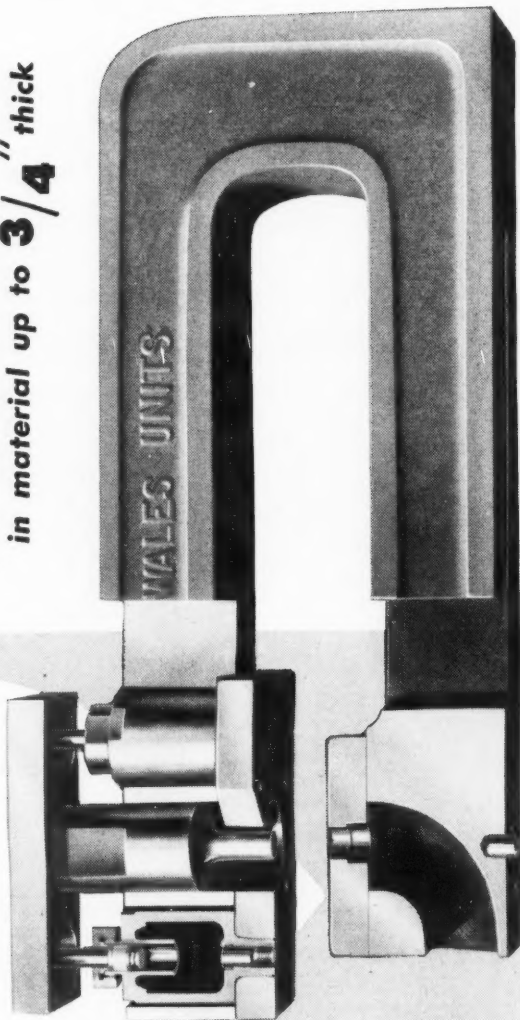
Announcing

WALES **HYDRA-SPRING UNITS**

for

punching round or shaped holes
in material up to **3/4"** thick

Heart of Wales
Hydra-Spring Hole Punching Unit



Above cutaway view of Wales Hydra-Spring Hole Punching Unit shows two Wales Hydra-Springs (one on each side of the punch). The Hydra-Spring at left of the punch is a cross-section view.

A major **PROBLEM** in perforating sheet metal has been the stripping of thick material... not the punching. Wales Hydra-Springs solve this age old problem by providing many times more stripping pressure than mechanical springs of the same volume.

These *revolutionary* springs permit compact, self-contained, independent Wales Hole Punching Units to punch and strip material up to $\frac{1}{2}$ " thick.

Such *outstanding performance* is the result of utilizing the compressibility of special fluids. Wales Hydra-Spring loads may be changed by a simple adjustment to increase or decrease the volume of fluid.

This is too big a story to tell in this space so **WRITE TODAY** for complete information on Wales Hydra-Spring Hole Punching Units.

WALES-STRIPPIT CORPORATION

George F. Wales, Chairman
398 Payne Avenue, North Tonawanda, N. Y.
(Between Buffalo and Niagara Falls)

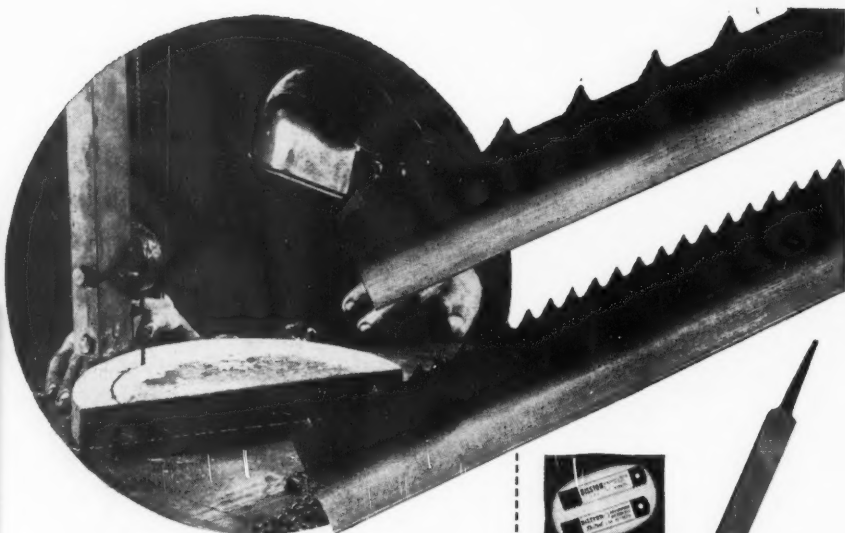
Wales-Strippit of Canada Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

A straight line setup of the same group of Wales Hydra-Spring Units as shown at left with $\frac{1}{2}$ " thick punched work in foreground. The only limitation of the number of holes punched in each operation is the capacity of the stamping press or press brake.

Showing the same setup of Wales Hydra-Spring Hole Punching Units as shown at left with work on top of dies ready to be punched. Note nothing is attached to press ram.





**For top production...
precision work...lower costs—**

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METAL CUTTING BAND SAWS

Higher defense production schedules demand more efficient production tools. With Disston Metal Cutting Band Saws you get full speed production with longer tool life. Made from Disston Steel—with Disston Skill—Disston Metal Cutting Band Saws are characterized by their uniform hardness and temper... their toughness... and their longer lasting edges. Made in both Hard Edge Flexible Back and Hardened Throughout styles. Regular and Buttress Tooth patterns; tooth spacings, settings, widths, and gauges to fit your requirements.

DISSTON SAFETY REEL—Conveniently holds 100 ft. band saw coils reeled for safety. Widths from $\frac{1}{8}$ " to $\frac{1}{2}$ ". Packed in cartons.

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**DISSTON MULTI-
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—for the machinist who regularly works on a wide variety of metals. Special tooth shape and spacing to cut aluminum, brass, copper, iron, and steel. Double-cut sides with single-cut edges. Combine fast-cutting and long life with a minimum of clogging.



*In peace waste is a sin...
NOW—waste is a crime*

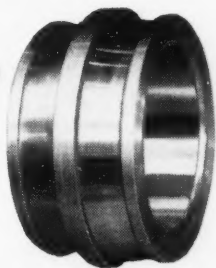
A free service for industrial tool users. Write for copy of "The Pocket Foreman" containing complete information.

**"SCRAP TURNED IN...
IS STEEL TURNED OUT!"**

Steel mills urgently need more scrap now. Keep your scrap moving into channels serving steel mills.

SKF RACES

Against Time...



with the new

GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

These new Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

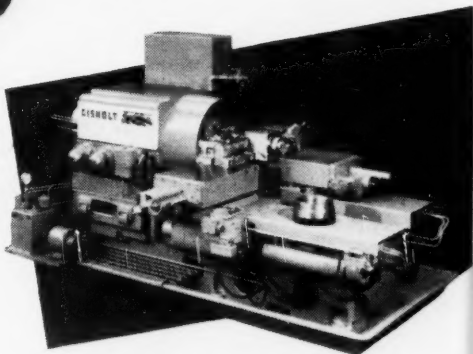
The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

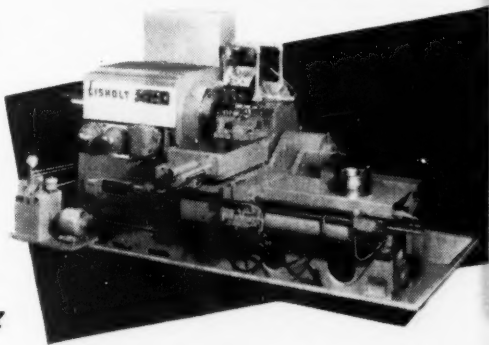
THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



**TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES**



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.



Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."



Courtesy Arnolt Co., Warsaw, Ind.

Here's an "on-the-spot" answer to push-pull and rotary control problems. As shown above, with only a single S.S.White flexible shaft, the light can be swung 360° or tilted up or down simply by turning the control knob or by moving it in or out.

In addition to the obvious advantages of this arrangement, the S.S.White flexible shaft is easily installed and allows both the light and control knob to be mounted in the most desirable location.

SEND FOR THIS 256-PAGE FLEXIBLE SHAFT HANDBOOK

Complete, authoritative information on flexible shafts sent free if you write for it on your business letterhead.



THE *S.S. White* INDUSTRIAL DIVISION
DENTAL MFG. CO.



Dept. 10 East 40th St.
 NEW YORK 16, N. Y.

Western District Office • Times Building, Long Beach, California

2 Duplicators in 1

with
**TWIN
SPINDLES**
...a **GORTON**
Tracer-Control
Development

Now engineers can plan
ahead for stepped-up
production with the
duplicator they specify today!

**A Tip
to Increase
Defense Production**



Two sets of
multiple blades
duplicated simulta-
neously from
single master blade
on Gorton 9-J.

You'll find Gorton Twin-Spindle Duplicators ideal for long production runs of profiling or die and mold cutting operations—both roughing and finishing, in two or three dimensions.

If your present production schedule doesn't warrant twin-spindle operations, install a conventional Gorton Duplicator now. Whenever you feel the need, you can easily change to the twin-spindle head and ram assembly—cost of conversion only 22% of complete single-spindle machine. This doubles the ability of your duplicator to turn out work.

Whether you need a conventional or twin-spindle duplicator, Gorton's general catalog contains important information for you. Write for it.

JOB FACTS

Gorton Super-Speed 9-J Duplicator with twin-spindle head assembly and rotary tables, equipped with two high-speed, 4-flute spiral cutters turning at 980 rpm for both roughing and finishing, profiled from the solid 20 impeller blades 9/16" high by 2" long. Cutting time: 4½ hours. **BONUS:** One extra identical work piece finished completely from one simple master of one blade.

**GEORGE
GORTON
MACHINE CO.**

1704 Racine St., Racine, Wis., U. S. A.



Please send at once complete information about the Gorton line contained in Bulletin 1655-1704.

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Name
Title
Address
City, State



Guest Editorial

By
JOHN L. McCaffrey
President, International Harvester Company

Lost Treasure

NOT many people read the lost and found columns of newspapers. But these columns reveal clearly some of the possessions people value highly.

Pocket books and purses. Pets of all kinds. Jewelry. Sentimental trinkets.

The columns reveal, also, that people who have lost something they treasure are much concerned about getting it back. People who have found something, by the language of their notices, show less concern about restoring it to its rightful owner. The broken hearts belong to the losers.

The prized possessions which people lose and seek to recover through the lost and found columns are much like the things which a nation prizes and loses, and then seeks to recover. Thus, our America, amid all her perplexities, may well need to advertise soon in a lost and found column:

"Lost—the former strong feeling of self-reliance and sense of individual responsibility on the part of my people. These lost virtues believed to have been led astray by lures of the welfare state. Concerned lest their continued absence threaten my existence. Finder please notify at once and claim handsome reward."

Events over the last quarter century have drawn us, as in a web, into a worldwide struggle between two clashing philosophies of life. Preservation of our

country, its free institutions, and its way of life are at stake. When the stake is so high, the sacrifices must be in proportion.

But America has surmounted every obstacle—thus far. And I believe the biggest reason has been the strong self-reliance and sense of individual responsibility which our people have had in the past. A strong nation of self-reliant men and women, willing to assume responsibility for themselves and their families, is unbeatable.

The nations which have declined and gone down to defeat have been those where the people gave up their self-reliance and leaned instead upon the government; where people encouraged governments and other groups to do things their own consciences would not allow them to do as individuals.

That is how nations can be destroyed. That is how America can be destroyed!

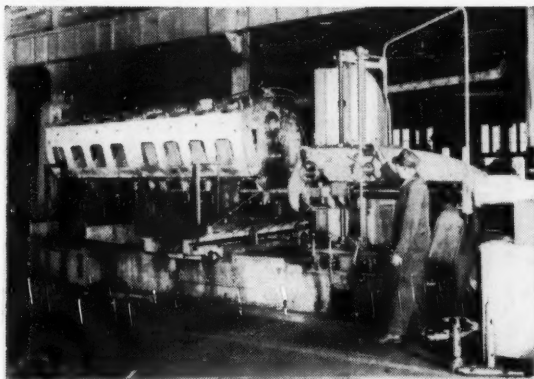
Our nation was not founded by men who looked to anyone to take care of them. It grew to greatness under the leadership of self-reliant men. Only in the last quarter century has the new doctrine been advanced that people should rely on government for their needs. Too many of our people in all walks of life have embraced it. They have forsaken our heritage of self-reliance.

What, then, do we propose to do about this heritage which we now seem to be in real danger of losing? Will we grow soft and flabby in the belief that government will take care of us? Will we continue to pay in taxes fantastic shares of our incomes? Will we be content to have government regulate, direct, and control more and more of our lives?

If we do, we will have lost the strong, vibrant forces of self-reliance and individual responsibility. If we do, we will have lost what has made America great.

I believe it is within the heart and mind of nearly all Americans today to stand forth and be counted as the kind of men that helped make America great!

*a Boring plus Performer**



FOR *Diesel* CRANKSHAFT BEARINGS

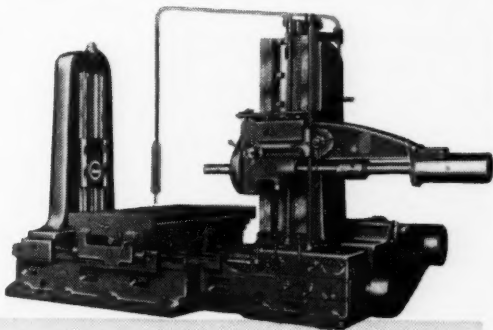
** And Now* **BETTER PERFORMANCE** *with*

1. Broad Rigid 4-WAY bed
2. Heavier box type saddle and table.
3. Motor-driven lubricating pump for the gear boxes.
4. Improved hydrodynamic main drive.

Here is a typical example of the adaptability of the Horizontal Boring Machine for a wide range of Diesel shop requirements. This 5" machine, installed in a large mid-western shop in 1946, is shown boring a Diesel frame for crankshaft bearings using a 6" dia. x 16' bar and employing five tools at the same time. It has been used exclusively for this work for the past two years.

The new redesigned Bullard Horizontal Boring Machine is equipped to provide still higher standards of maintained accuracy and more versatile performance. The new heavier design, features a massive 4-WAY bed, motor-driven lubricating pump for the gear boxes, improved hydrodynamic main drive and other important improvements. Write for complete details or better still, have a Bullard man tell you what a Bullard Horizontal Boring, Milling and Drilling Machine can do for you in your own shop.

**THE
BULLARD
COMPANY**
Bridgeport 2, Conn.



ARMSTRONG

TOOL HOLDERS . . .

for every operation!

There are ARMSTRONG TOOL HOLDERS in sizes and types for every operation on lathes, planers, slotters and shapers—for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALLOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

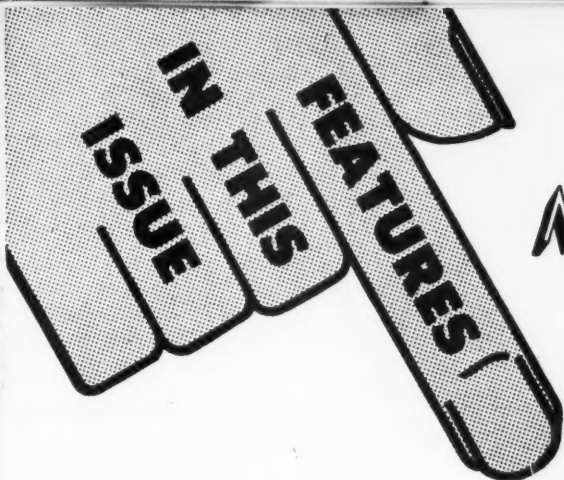
Write for Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5228 West Armstrong Ave., Chicago 30, Illinois





ISSUE

IN THIS

FEATURES

MODERN Machine Shop

April, 1952

Vol. 24, No. 11

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By Gilbert C. Close

McCulloch Motors of Los Angeles has recently completed a five million dollar plant expansion program. This story is concerned with the application of many of the modern tools which were installed in the plant as part of the modernization program. Page 96.

Machining Magnesium

By Frank Charity

A summary covering the unique properties of magnesium and magnesium alloys together with recommended methods of machining this material. Page 114.

Designing Clearance Recesses to Fit the Job, Part III

By Fred Rogers

The concluding article of this series in which the author discusses recesses for threaded parts. Page 148.

Helpful Hints on Coolant Use

By John E. Hyler

This is the first of a series of articles in which the author offers some timely tips on how to obtain maximum coolant efficiency. Page 168.

Safety Devices for Dies and Machines

By C. W. Hinman

A continuation of the author's review of the many commercially available safety devices for both dies and machines. Page 186.

So You Want to Save Materials

By Bartlett West

Mr. West tells how Douglas Aircraft is now saving thousands of dollars through the use of a well-organized material conservation plan. Page 200.

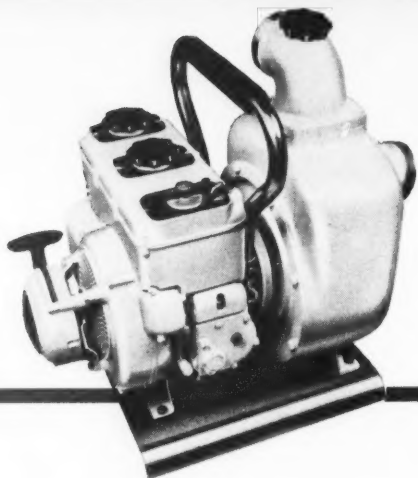
When Turnover Becomes a Problem

By Alfred M. Cooper

In this article the author briefly analyzes five situations that usually exist wherever employee turnover has developed into a serious problem. Page 222.

Highlights of the Papers Presented at the ASTE Technical Sessions

A summary of the more important points brought out by each of the authors who reported at the ASTE meeting in Chicago. Page 380.



Typical McCulloch product—a 7 H.P. centrifugal portable water pump and engine.

Streamlined Engine Production

By GILBERT C. CLOSE

Latest tooling methods featured in McCulloch Motor's five million dollar plant expansion program.

FROM an embryonic west coast beginning in 1946, McCulloch Motors Corporation, Los Angeles, California, has mushroomed in the short period of five years into one of the nation's largest manufacturers of extremely light weight, engine-driven tools. The tools being mass produced at the present time include portable engine-powered chain saws, portable engine-powered post hole augers, and portable engine-powered centrifugal water pumps. Produced in lesser quantity are engines used to power Air Force target airplanes, and currently the company is embarking on a program to mass produce helicopters for private ownership, and for the various military services.

When the five million dollar plant expansion program just completed is tooled and in full operation, McCulloch production engineers predict that a completed engine, ready for installation on one of the tools, will leave the production line every 30 seconds.

This phenomenal production potential, reached in such a short period of time, cannot be attributed to plant size and personnel compliment alone. McCulloch's management and personnel policies have already attracted the attention of the nation's business leaders. Unit production per employee is outstanding. Wages and personnel facilities are maintained at a level to induce maximum incentive.

From a more physical standpoint,

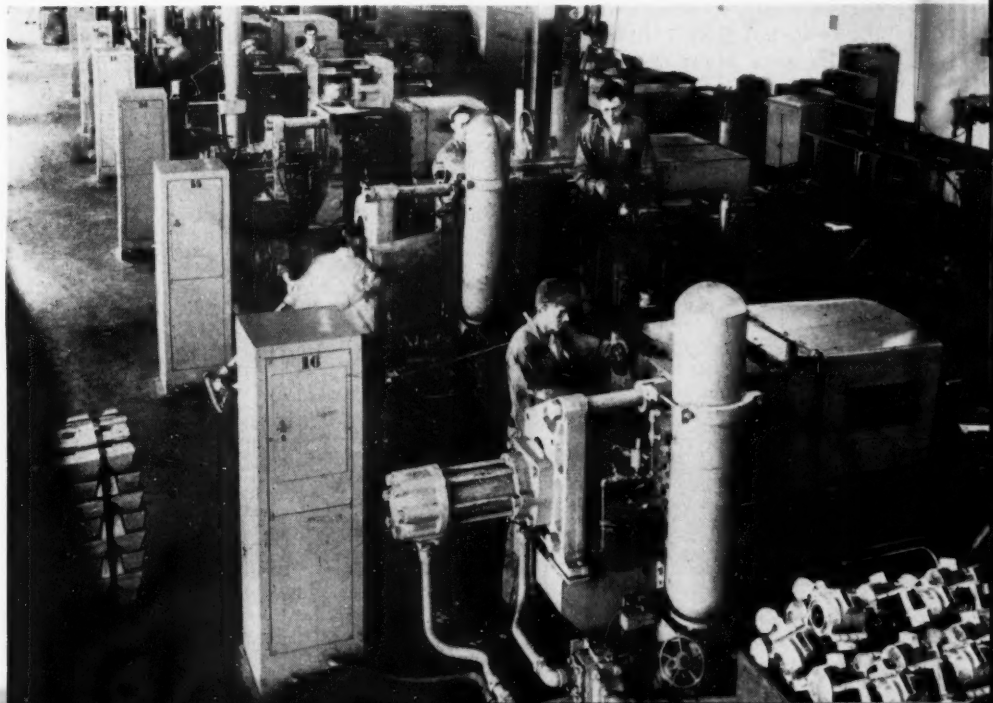
the company's production lines have been laid out and equipped for maximum efficiency and speed. This is facilitated by a mock-up of the entire factory, with a model of each machine in its relative position, maintained in the plant engineering department. Production units converge from their respective production lines into a central assembly area, then flow in normal sequence through the finishing department, inspection, and then to shipping. Long distance handling is reduced to a minimum.

From the very start, McCulloch's major policy has been one of self-sufficiency. Sub-contracted units are kept to a minimum. Specialized automatic machines are installed wherever they can serve efficiently. Conventional machines have been tooled to perform as

many as eleven operations at the same time. The company maintains one of the nation's largest production die casting departments, and a die tooling department for designing and producing the required dies. The engine line incorporates a complete gear cutting department to produce components so often purchased from specialized subcontractors. Heat treatment of the various production units is accomplished by specially tooled induction heating units installed wherever they are needed along the production lines.

Because gasoline engines are used to power all McCulloch tools, the engine line is by far the largest in the plant. A brief survey of its major features will indicate why and how the high production figure is maintained.

Partial view of the McCulloch die casting department. Currently, 15 die casting machines handle some 125,000 lbs. of Dow Metal "R" casting alloy each month.





Machining one section of a multiple cavity die in the die tooling department.

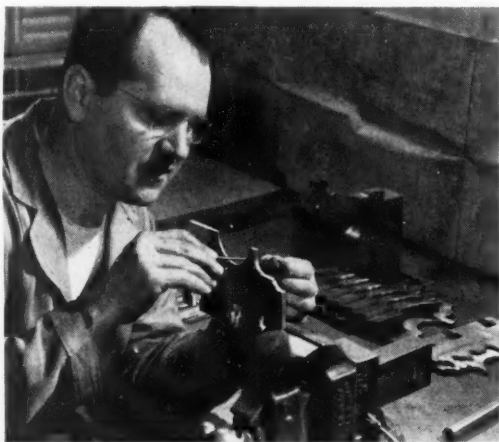
in the die casting department.

Fifteen die casting machines are now in use. These include 12 Reed-Prentice, two Cleveland, and a recently installed Lester-Pheonix machine. All machines are of the straight cold chamber type, and all are adjustable over a wide range of operating conditions. Injection pressures may be varied between 5000 and 25,000

To begin with, the "light weight" features of all McCulloch tools is attained by extensive use of magnesium die castings. Currently, some 125,000 lbs. of magnesium are being die cast each month. This goes into the production of about 65 different parts varying in weight from 1/10 ounce to three pounds each. Many of the die castings are used in the engine. Typical die cast engine components include cylinders with cooling fins, crankcases and crankcase covers, gear cases and covers, carburetors, oil cleaners and covers, and so on. Thus, in logical perspective, the "engine line" actually starts

psi, while die locking pressures (used to hold the die halves together during injection of the metal) range from 100 to 600 tons. Each machine is equipped with its own hydraulic pressure unit.

Production speed on the die casting machines varies with the complexity and mass of the part, and runs between 15 and 125 "shots" per hour. Small parts may be ejected from the die in a



Filing one part of a sectional die used to die cast magnesium engine cylinders with cooling fins. There is one of these sections for each cooling fin. When wear or damage occurs, a die section can be replaced much cheaper than to replace the entire die.

few seconds after casting, while parts of heavier mass may require up to $\frac{1}{2}$ minute to solidify. Die temperature is maintained at approximately 400 degrees F., either by hand torch heating or by water cooling as the conditions justify.

from pressure cylinders into the dome of each holding pot to accomplish the same purpose. The furnace and pots are kept covered at all time to further minimize contact between the molten metal and the air. Preventing oxidation of the molten magnesium is one



View of magnesium die casting die storage department. Fork lift trucks are used to transport dies to and from machines. Die is pre-heated with a hand torch to about 400 degrees F. before any "shots" are made.

Dow Metal "R" magnesium die casting alloy is used exclusively. Ingot breakdown is accomplished in a Pacific Scientific Company breakdown furnace of 800 pounds capacity. The melt is then transported to the holding pots located at each machine by means of a pre-heated transport pot on a fork lift truck. The holding pots maintain the metal at optimum molten temperature (1250 degrees F.) until it is hand-ladled into the pressure chamber of the die casting machine. Ordinary magnesium flux to prevent oxidation is used in the breakdown furnace and transport pots. Sulphur dioxide gas (SO_2) is piped

of the most important and difficult aspects of the magnesium die casting process.

The magnesium die casting dies designed and built in the company's tooling department bear brief mention at this point. Die costs are a major obstruction to wider use of the die casting process. Tom Sera, McCulloch's chief die designer, says that the company has never worn out a magnesium die casting die. He attributes this to the sectional construction of the more complex dies, making it possible to remove and replace worn or damaged sections at a minimum of cost. As an



General view of the engine crankshaft line. When the new facilities are tooled, production will be two shafts a minute. Three days production time is required for part to traverse line, during which time 31 operations are performed.

example in this conjunction, the highly complex and costly die used for producing engine cylinders with cooling fins is constructed with a separate section for each cooling fin. Conventional hot works die steel is used for all contact surfaces in the die, and these contact surfaces are mounted in holding blocks made from a high grade casting alloy.

On high production parts, multiple cavity dies are used, making it possible to cast several parts in a single shot. In some cases, on low production small parts, large dies with several different cavities for producing dissimilar parts in a single shot have been

used with success. Holes with diameters down to 0.060-inch may be "cast in" by using die insert pins, and collapsible cores are used for casting undercut parts. Casting undercuts is practiced only when collapsible core costs are lower than the costs of subsequently machined undercuts.

Very narrow tolerances are maintained in the die casting operations. This eliminates most machining except for tapping of holes and milling of faying or close-fit surfaces. After de-burring and what machining is necessary, the magnesium die castings are dichromate dipped. This provides both a corrosion resistant surface coating and an excellent base for subsequently applied coats of paint.

In the machine shop section of the engine line, production of the precision crankshafts warrants attention. When the newly added and contemplated facilities are in full operation, production will match the 30 second interval

on completed engines. Travel through this department requires about three days for each shaft. During this time, 31 separate operations are accomplished.

The shafts, made of SAE 1050 steel, enter the department in a rough, drop-forged condition. They are first normalized to approximately Rc 20, then are rough milled 16 at a time in a Sundstrand Rigidmil. This operation roughs out the straight and tapered ends of the shaft, roughs the sides of the counterweights, and finishes the connecting rod clearance on the throw. In the next operation, a Sundstrand boring machine equipped with self-centering clamps drills shallow tapered holes in the ends of the shaft for subsequent centering for various operations.

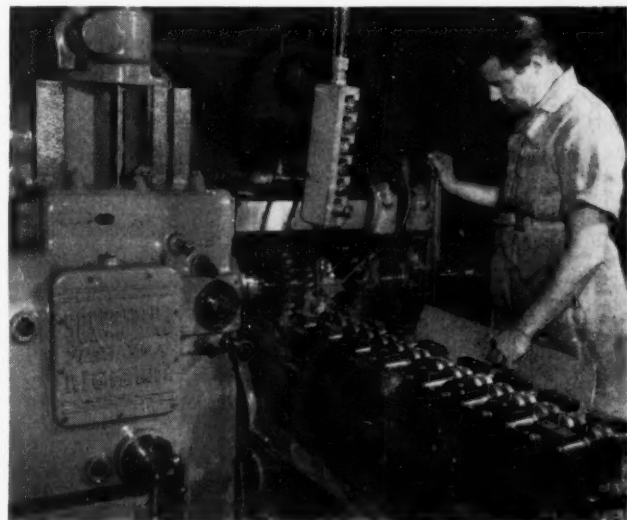
Next, five Model 8 Sundstrand automatic lathes in a row perform a series of cutting, finish-turning and finish grinding operations on the various shaft diameters, while a sixth Sundstrand Model 8 finish-faces the counterweights, cuts thread diameters, cuts four chamfers, and finish-turns one shaft diameter all in a single operation.

The valve lug on the shaft is milled in a Sund-

strand mill, then the throw is turned on a Fay 8-inch automatic. The shafts are then de-burred and placed in a three stage Thermonic Induction Heating unit for localized heat treatment of the taper end bearing journal, straight end oil seal diameter, and throw journal diameter. An automatic water quench follows the heating cycle, quenching the heat treated areas to about Rc57-Rc62.

After heat treatment, the shafts are straightened on a hand-operated hydraulic press, then go through a series of grinding operations on various size Norton grinders. In these operations, journal diameters are held within .0005-inch, and shaft taper confined within 0.0001-inch. After grinding, some straightening is necessary due to stress relief caused by the removal of surface metal in the heat treated areas.

After this final straightening, the flywheel mounting taper is prepared on a 6-inch Norton grinder, the cam



Rough milling sixteen SAE 1050 drop-forged crankshafts at one time on a Sundstrand Rigidmil.



Face grinding the crankshaft counterweights on a Norton grinder.



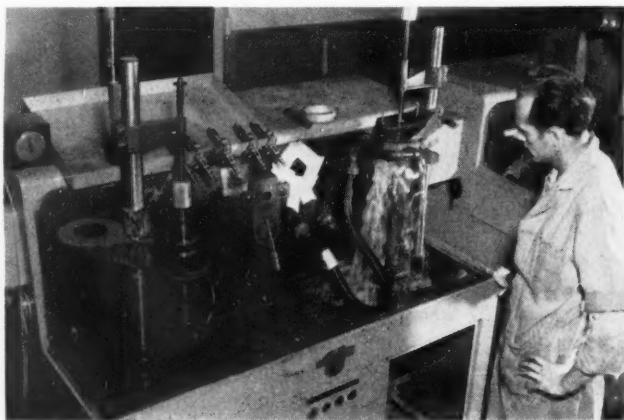
except for loading, is fully automatic. While three cylinders are being loaded, three are being finish bored. Indexing is accomplished by touching a control button. The rough bore leaves .016-inch for the finish bore, and the finish bore leaves .003-inch for the final honing

operations. After honing, the "cast-in" sparkplug holes are spotfaced, then tapped on a Haskins tapping machine. Production rate on the big Barnes ranges from 95-110 finish-bored pistons per hour.

The aluminum pistons for the engines go first into a Sundstrand Automatic No. 4 where the skirt is

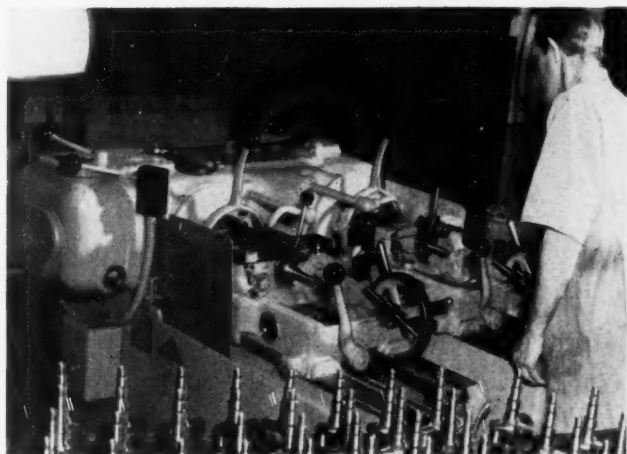
is buffed to prevent pushrod wear, a Landis thread mill puts 7/16-20 threads on each end of the shaft, and a Cincinnati Rise and Fall Mill cuts shaft keyways. The shafts are then cleaned, given a 100 per cent diameter check, and are ready for the assembly line.

A huge, specially-built Barnes boring machine is used to prepare the die cast engine cylinders. This machine,



Three stage Thermo-nic induction heating unit conveniently located in crankshaft line. Machine accomplishes localized heat treatment of the taper end bearing journal, straight end oil seal diameter, and throw journal. Automatic water quench is used.

Threading two crankshafts at a time on a Landis thread mill.



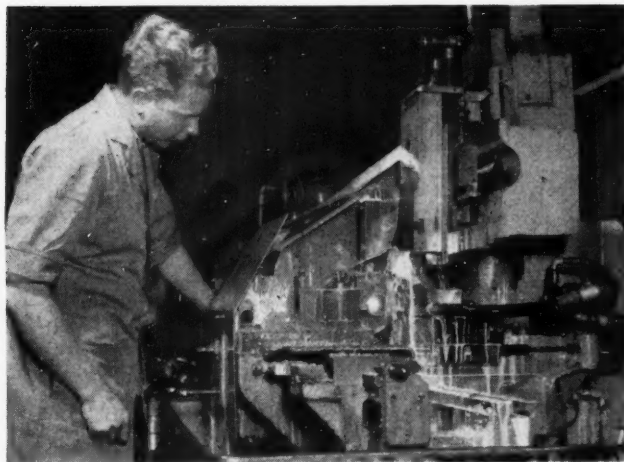
counterbored and chamfered inside and outside on the corners. Next, the wristpin hole is bore drilled. Another Sundstrand No. 4 automatic is provided with eleven tools in two slides and a carriage. This machine turns the piston diameter, turns the dome, roughs and finishes the ring grooves, chamfers the ring grooves, and cuts three heat grooves all in a single operation.

A Nichols mill is used to cut the Woodruff slots in the wristpin holes for the pin retainers, then an Ex-Cell-O boring machine with six spindles

rough bores three pistons at a time, puts in snap ring grooves and chamfers the wristpin holes. A Landis centerless grinder is used for the final piston O.D., resulting in tolerances within 0.004-inch on the taper and 0.001-inch on the O.D.

After final deburring, the pistons are tin-plated by dipping them successively in a caustic cleaner solution,

water rinse, weak nitric acid etch, another rinse, into a hot sodium stannate solution from which the tin is deposited.



This Sundstrand Model 4 automatic lathe is provided with 11 tools in two slides and a carriage. It turns the piston diameter, turns the dome, roughs and finishes the ring grooves, chamfers the ring grooves, and cuts three heat grooves all in a single operation.



This large, specially built Barnes boring machine rough bores and finish bores three pistons while three more are being loaded in holders. Operation is automatic. Production rate—about 90 cylinders an hour.



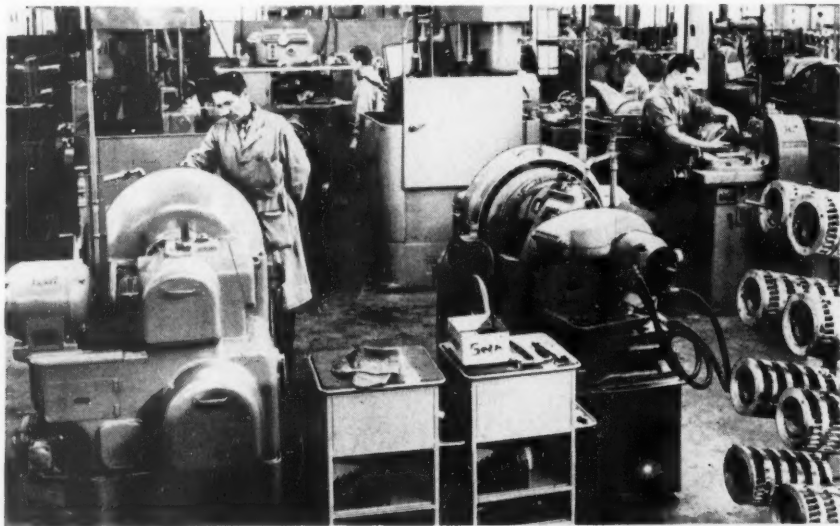
The die cast magnesium gear cases require a minimum of finishing. The various bores and diameters are prepared on an Ex-Cell-O boring machine, and a Cleveland tapper is used for tapping.

The majority of connecting rod finishing operations are accomplished on a single big indexing Kingsbury Drilling and Reaming machine. This machine drills and reams both

ed, then into a hot water rinse to facilitate quick drying.

the crankcase bore and wristpin bore to within 0.002-inch, while maintaining

General view of precision gear cutting department.



SHEARING and

The Story of a Team

Steel sheets for these Giant Marion Shovels are formed with great accuracy on a Cincinnati 210 Series Brake. The blanks sheared square and true on a Cincinnati 100 Series Shear contribute to this accurate forming that speeds and simplifies assembly.

This Cincinnati Brake, with 16 feet of die surface, is forming $\frac{3}{4}$ " plate into lower frame pieces. The one inch capacity shear is cutting $\frac{3}{4}$ " plates for the shovel platform or upper deck.

Save time, save money with this dependable Cincinnati Team.

Write for Shear Catalog S-6 and Brake Catalog B-3.

FORMING

a GIANT

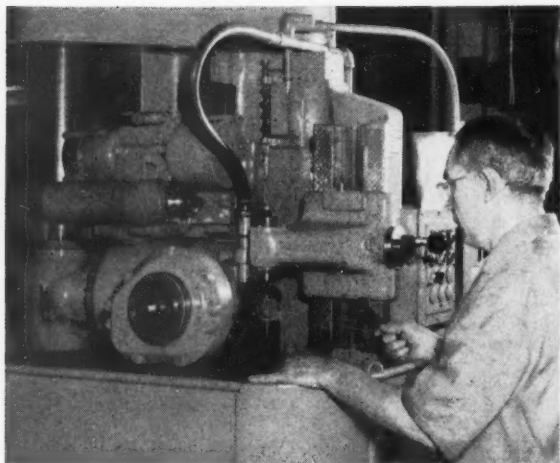
The Marion 5561, World's Largest Mobile Land Product, with a 45 cubic yard shovel. Photos—Courtesy of Marion Power Shovel Co., Marion, Ohio.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



Lees-Bradner gear shaver in action. Tolerances maintained are plus-or-minus 0.001-inch on gear size, and plus-or-minus 0.0002-inch on gear straightness.

a hole centerline tolerance within 0.004-inch. It also bores the break holes in the crankshaft journal end of the shaft to within 0.002-inch tolerance. Current production rate on this machine is about 90 rods per hour.

A unique method is used to prepare the crankshaft journal end of the connecting rod so that it can be uncapped for removal from or mounting onto the shaft. Instead of cutting, as is usually practiced, this bearing cap is "broken" away in a 4-ton Benchmaster Hydraulic Press. The faying surfaces are then left in the "as fractured" condition, and when rejoined, after mounting of the rod on the shaft journal, produce an ultra-smooth and unmarred inner bearing surface.

The engine finishing department at McCulloch is fully mechanized. Continuous overhead conveyors transport the engines through the various cleaning tanks, past tables where masking is applied, through the paint booths, and then directly into the final inspection and run-up departments.

The newly developed "hot spray"

method of paint application is employed. The paint is heated by a steam coil mounted on the paint pot pressure hose about three feet back from the spray gun. The heat reduces the viscosity of the paint so that less thinner is required. This not only saves thinner costs, but reduces drying time and reduces the amount of solvent vapors that enter the shop atmosphere during drying. Overhead tubular-type ovens after each paint booth further speed drying time. These ovens are not of the conventional infra-red lamp type, but are the increasingly popular "Cal-Rod" ovens wherein the heating element is composed of a number of heated rods running full length of the oven and spaced each few inches around the inside periphery.

After finishing, each engine is given a complete run-up check and final inspection. It is then ready for mounting on the tool for which it is intended. The engines are not all alike, but due to the quantity production, can be routed through the shops and along the line in sufficient "batch" quantities to reduce tooling changes to a minimum.

While this engine line is only one of several product lines now active in the McCulloch plant, its efficiency and production speed is representative of the others. Nothing is omitted on any



THREAD MILLING A SCREW.

Metal: SAE 2345 steel heat-treated to 28 Rockwell • Machine: Lees Bradner thread miller • Part: 5/4" adjusting screw for press brake • Operations: rough and finish thread milling • Tool: high-speed steel • Feed: 0.260 depth on roughing • Cutting Oil: Sunicut 105



BROACHING A GEAR KEYWAY.

Metal: SAE 2345 steel forging 220 Brinnell • Machine: 3L8 La Pointe hydraulic broach Part: gears for shaper, produced two at a time • Tool: 3' high-speed steel broach • Cutting Oil: Sunicut 105

SUNICUT 105 REPLACES THREE OILS AND SOLVES FIVE MAJOR PROBLEMS

Buying three cutting oils and then blending them to make additional grades had proved highly unsatisfactory to a machine tool builder. The smoke was noxious, employees complained of skin irritations, the color of the oils made it difficult to see the work, tool life was short and finishes not up to standard. To help solve these problems, the company called in a Sun representative and on his advice tested Sunicut 105 on the three tough jobs pictured here.

So good were the results Sunicut 105 was adopted exclusively for every machine in the plant and has been in use for two years. The operators like its transparency. There are no complaints about smoke or skin irritations. Finishes have improved and tool life increased as much as 50 percent.

For our informative booklet "Cutting and Grinding Facts," write Dept. MM-11.



CUTTING A LARGE GEAR.

Metal: bronze 180 Brinnell • Machine: Gould & Eberhardt gear hobbing machine • Part: main drive worm gear wheel for large shear 42 1/2" O.D.; 5" thick; 87 teeth Tool: high-speed steel hob • Feed: 0.006 • Speed: 42 rpm • Cutting Oil: Sunicut 105

SUN INDUSTRIAL PRODUCTS

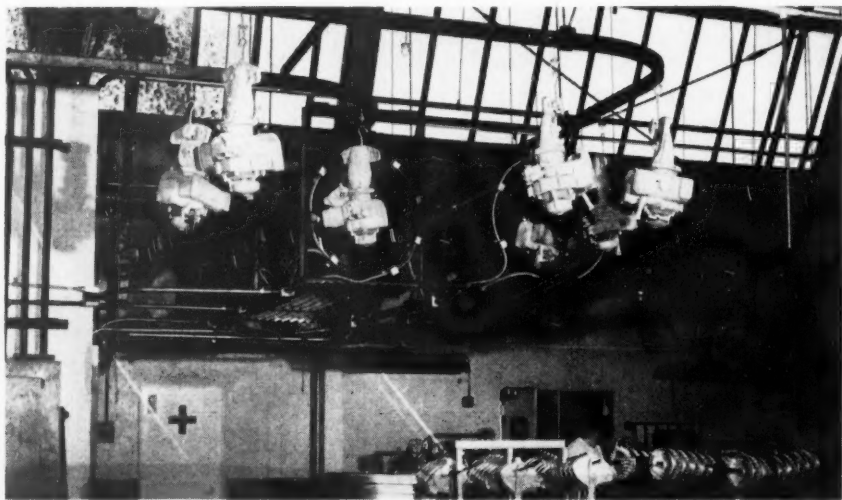
SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



of the lines that will result in greater production speed, better quality, or improved working conditions. Close attention to the details of production, sluffed off in many shops as unworthy of attention, irons out and smooths production all along the many lines.

In a recent article in *FORTUNE* magazine, the management and per-

assuming national importance in the manufacture of precision optical products such as glass prisms and lens, and projection equipment. Paxton Engineering Company is another subsidiary noted for precision products, as is the recently acquired Rhodes-Lewis Co., noted west coast accessories manufacturing firm.



Two "Cal Rod" overhead drying ovens in the painting department. These ovens utilize infra-red radiations from heated rods rather than from conventional heat lamps.

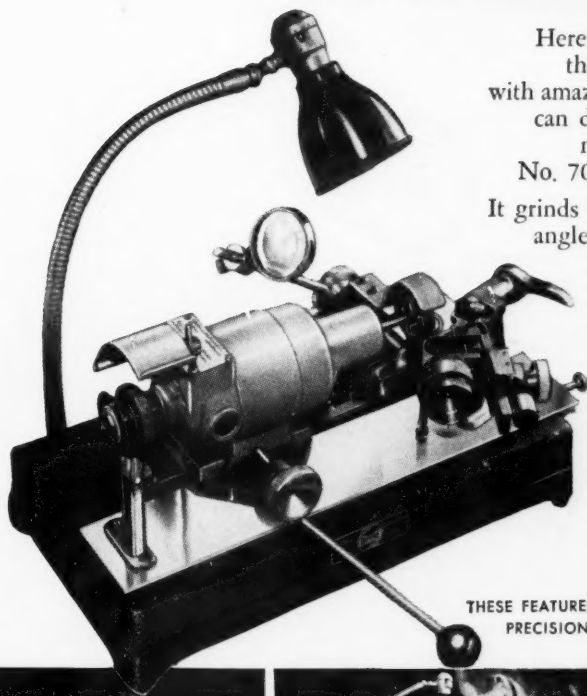
sonnel policies in effect at McCulloch Motors Corporation were discussed and praised. This article has attempted to show the other side of the picture—the more technical side. Policies and equipment are complimentary factors in production. One without the other is ineffective. At McCulloch, the two have been blended in just the right proportions it seems.

Over and above its budding helicopter project (which was entirely company financed), a subsidiary company, Pacific Optical Corporation, is rapidly

In overall perspective, the phenomenal growth and success of McCulloch Motors can be expressed only in colloquial idiom. "They've come a long ways in five short years, and seem to be going farther yet!"

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

This new **DUMORE**® grinder eliminates hand sharpening of small drills



Here's a remarkable new grinder that sharpens small twist drills with amazing speed and precision. You can do away with expensive shop maintenance of 2-lip drills — No. 70 to 1/4".

It grinds a drill point to any included angle from 90° to 150°, clearance angles 5° to 15°. Quickly sharpens and reclaims small-size, dull and broken drills. Dumore sharpened drills stay sharp longer, last longer. Get correct hole size, better hole finish every time. Hold scrap losses to a minimum.

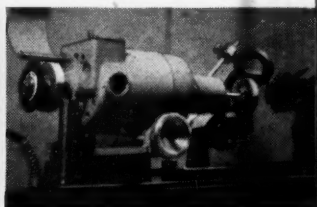
THESE FEATURES MAKE THE DUMORE
PRECISION GRINDER BETTER



EXCLUSIVE FEED-IN ATTACHMENT — Eliminates breakage and wheel gouging. Allows fine control of finish cuts. Speeds difficult sharpening, requiring extreme changes of point or clearance angle.



BROKEN DRILL RECLAIMER — Drills can be rough ground and reshaped on roughing wheel . . . then sharpened. (Grooved drill rest also serves as holder and locating fixture for diamond wheel dresser.)



ECONOMICAL WHEEL COST — Only uses wheel face. No expensive, shaped wheels. Individual wheels for web-thinning and roughing, eliminating frequent wheel dressing, assure longer wheel life.

Ask your nearby industrial distributor for a demonstration of this time- and money-saving Dumore Drill Grinder, or write

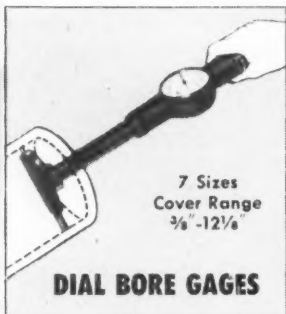
THE DUMORE COMPANY

1311 Seventeenth Street • Racine, Wisconsin

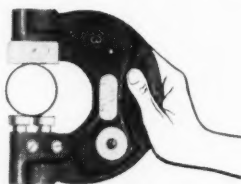
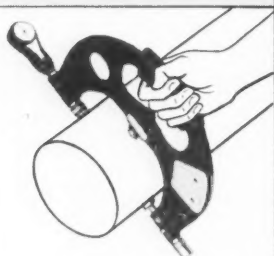
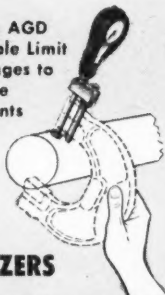


ALL THESE... and MANY MORE

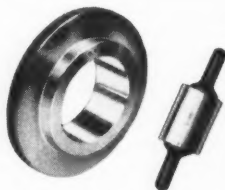
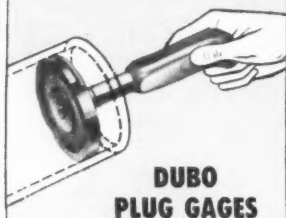
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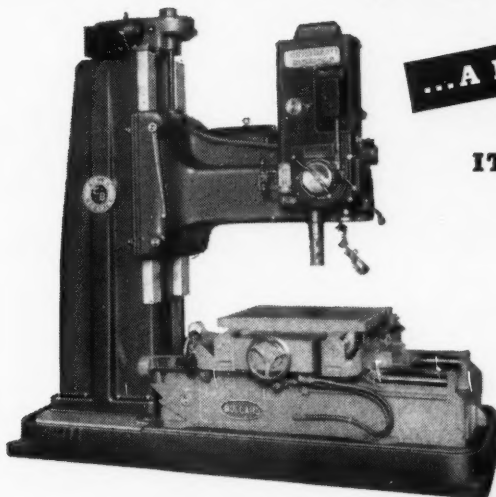


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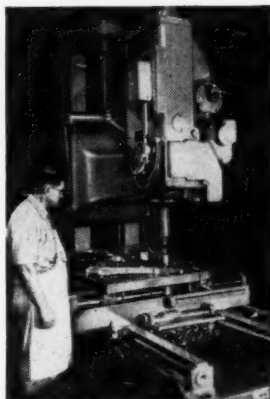
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MACHINING MAGNESIUM



Neat, orderly factory work areas are essential to safety as well as efficiency in the fabrication of magnesium and its alloys.

A summary covering the unique properties of magnesium together with recommended methods of machining this material.

By FRANK CHARITY

ALTHOUGH magnesium and its alloys have machining qualities that can be generally described as good, experience has proved that certain physical characteristics of these materials must be taken into consideration if machining difficulties are to be avoided.

High clamping pressures tend to cause greater springing in magnesium than in most other metals under similar conditions. For this reason, care must be taken when clamping and chucking workpieces made of this material. Extremely heavy depths of cut and feeds are also apt to cause the work to spring. Reamers and taps are

designed to eliminate the springing of the metal when it is cut.

Temperatures developed in cutting magnesium are quite low, but low heat capacity and high thermal conductivity sometimes result in magnesium parts becoming heated during machining if production requirements are high. Under such conditions consideration must be given to the possible thermal expansion of magnesium. The coefficient of thermal expansion is 0.000 0143 for the temperature range of 70 to 200 deg. F. This is approximately equal to that of aluminum and considerably higher than that of steel. An appreciable increase in the temperature of

magnesium parts therefore will cause a slight increase in dimensions. It is also necessary that extreme variations in room temperatures be avoided as this condition will also cause dimensional variations.

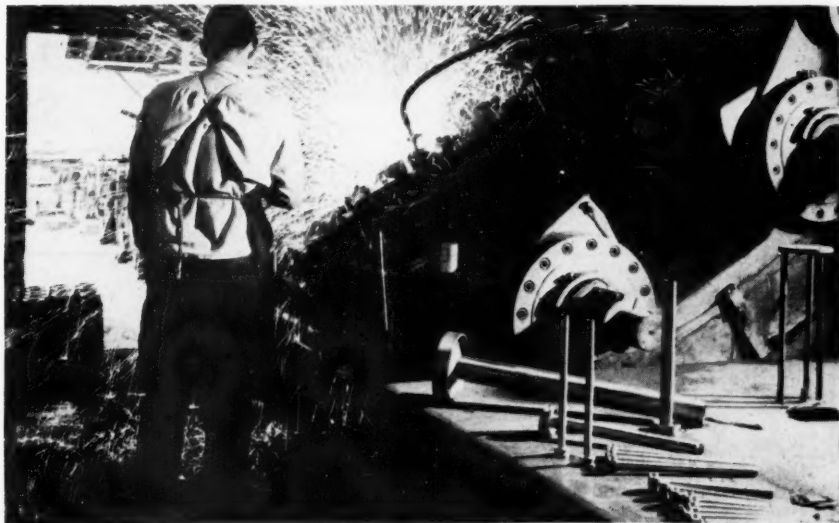
The power required to remove a given amount of magnesium by machining is much lower than that required to remove an equal amount of any other commonly used metal—varying from 0.15 to 0.3 cubic inch per minute. The data presented in Table 1 shows the average relative power requirements to machine a number of common metals. The low power required for machining magnesium makes it possible to take heavy cuts at moderately high speeds. It must be remembered, however, that when machining at extremely high rates of speed large quantities of metal are removed in extremely short periods of time. Hence, the total power

required is proportionally great.

Magnesium in all its forms is a free machining metal. Machining chips are usually well broken and do not obstruct the work or cutting tools. The type of chip produced is dependent upon the alloy, the form and condition of the alloy, and the feed used. Rake angles, cutting speeds, and cutting fluids which exert major influences on chip formation when machining other metals have little or no influence on the form of magnesium chips.

One of the outstanding machining characteristics of magnesium alloys is the ability to take an extremely fine grind magnesium in order to obtain a smooth finished surface. Surface smoothness readings of three to five micro-inches have been reported for finish-turned magnesium. These surfaces were produced at both high and low cutting speeds with or without cutting fluids.

Finely-divided particles, produced in machining magnesium, can become a fire hazard in some circumstances. But this can easily be eliminated by a few simple precautions.





Difficulties have been encountered due to the tendencies of magnesium stock materials to spring, but these can usually be eliminated if adequate care is taken in clamping and chucking the materials.



relief and clearance angles. Relief angles from 7 to 12 degs. keep the tool flanks from rubbing on the work, and minimize the adherence of chips to the tool. Clearance angles are larger than

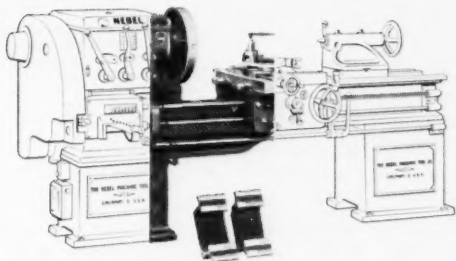
Standard cutting tools are used to machine magnesium alloys; but when taking full advantage of the high cutting speeds and feeds possible with magnesium, they are somewhat modified.

The low temperatures and pressures developed in cutting magnesium allow a wide latitude in choice of tool angles, but special attention is paid to

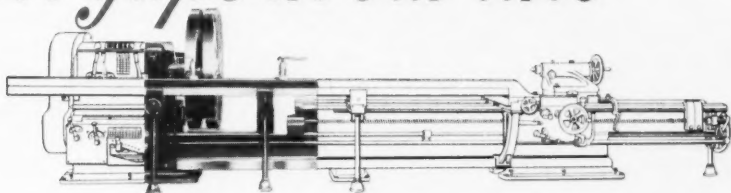
those normally used for other metals to provide larger chip spaces. Best tool life and chip formation are obtained if the rake angles are held from 0 to 15 degs. They may be increased if it is desired to reduce tool forces, but some tool life will be sacrificed. Smaller rake angles are used with carbide tools than with high speed steel to prevent chipping.

Table I

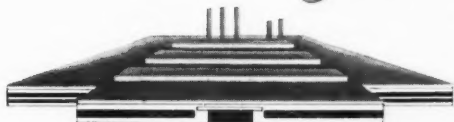
RELATIVE POWER REQUIRED TO MACHINE METALS	
Metals	Comparative Amount of Power
Magnesium alloys	1
Aluminum alloys	1.8
Brass	2.3
Cast iron	3.5
Mild steel	6.3
Nickel alloys	10



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The values for the end and side cutting edge angles are not critical and are best determined by the conditions of the individual job. Extremely large side cutting edge angles are avoided, however, to prevent chatter. Since magnesium alloys produce a large volume of chips, it is necessary that chip spaces be considerably larger than those used in tools for other metals. This is especially important in drills,

taps, reamers and milling cutters. Also the nose radii of tools are minimized to improve surface finish and prevent chatter.

Carbon tool steels are used for finishing tools, reamers, drills and taps for magnesium alloys, but high-speed steel is preferred for practically all drills, taps, and reamers. Cemented carbide tools are employed wherever possible, especially on production jobs,


because longer tool life results in better operating economy at high cutting speeds.

Cutting tools may be rough ground with medium-grain wheels, but finish grinding is done with fine wheels. Finishing cutting tools with a fine-grain wheel gives smooth tool faces and provides good cutting edges. Aluminum oxide 100-grit wheels are satisfactory for finishing high-speed steel tools while 320-grit silicon carbide or 200 to 300-grit diamond wheels are usually recommended for finishing cemented carbide tools.

For many cutting operations tools are not used to the full

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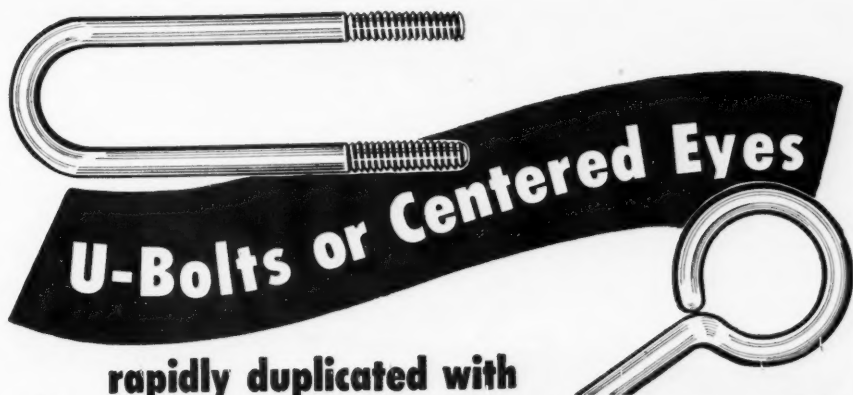


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extent of their possible life, but are re-sharpened while slightly dull to maintain good cutting edges and conserve tool materials.

Experimental tests and experience in many plants have shown that the purpose of cutting fluids when machining magnesium is primarily to cool the work and reduce the fire hazard. The improvement of surface finish and increase in tool life that are

obtained when using cutting fluids on other metals are of minor importance in machining magnesium.

While less heat is generated in cutting magnesium than is the case with other metals, the high cutting speeds, the high thermal expansion, and the low heat capacity of magnesium makes it necessary in some machining operations to disperse the heat developed in cutting. Machining heat

may be reduced by correct tooling and machining techniques, but is often of such intensity that applications of cutting fluids is necessary. The machining of irregular shapes or thin sections which might be easily distorted and multi-tool set-ups which create much local heating are examples of cases where cooling should be employed.

Efficient machining practice demands that high cutting speeds be used wherever possible. However, when high cutting speeds are used in the machining of magnesium and magnesium alloys, a fire hazard some-

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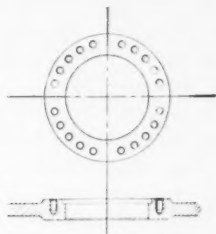
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times exists, particularly when fine chips are being produced. Although sharp tools greatly reduce this hazard and cutting feeds must be in the range of 0.001 inch and less to start fires,

magnesium. Almost any oil will materially reduce the fire hazard if applied in sufficient quantities; but to secure adequate cooling, the cutting oil must have a low viscosity. Since low visco-

Table II

PROPERTIES OF CUTTING FLUIDS USED IN MACHINING MAGNESIUM	
Properties	Value
Specific Gravity	0.79 to 0.86
Saybolt Viscosity at 100° F.	Up to 55 sec.
Minimum Flash Point (closed cup)	160° F.
Saponification Number, Maximum	16
Maximum Free Acid	0.2%

uncertainties in operations make it necessary to take precautions. Iron or steel inserts and sand cast surfaces which are apt to spark when hit with a cutting tool also add to the fire hazard. A stream of cutting fluid, of four to five gallons per minute per tool, is sufficient to practically eliminate the fire hazard.

If a particular job or machine tool prohibits the use of a cutting fluid, cutting speeds are reduced to below 500 feet per minute.

A wide variety of mineral oil cutting fluids will function satisfactorily on

sity mineral oils usually have low flash points, a fire hazard due to the oil is encountered. This necessitates a compromise between cooling power and flash point. Table II presents the range of properties of the most satisfactory cutting fluids. Additives which decrease the surface tension and increase the wetting power of the cutting fluids are beneficial. The chemical nature of magnesium makes it necessary that the free acid content of cutting fluids be below 0.2 per cent and that the use of vegetable or animal oils, which may oxidize and in-

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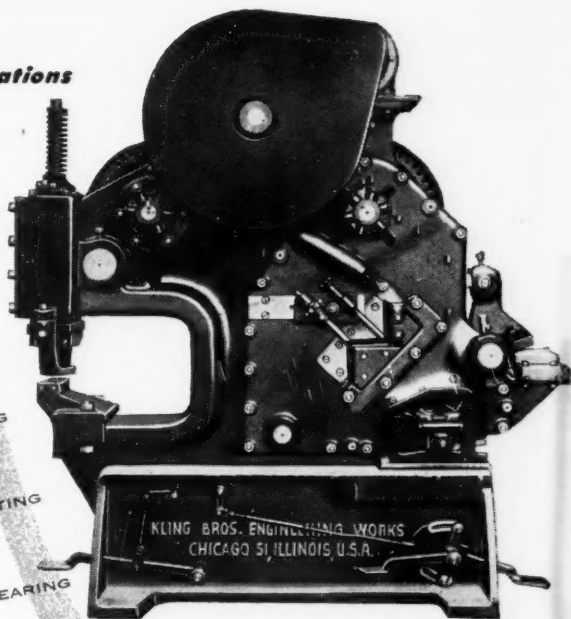
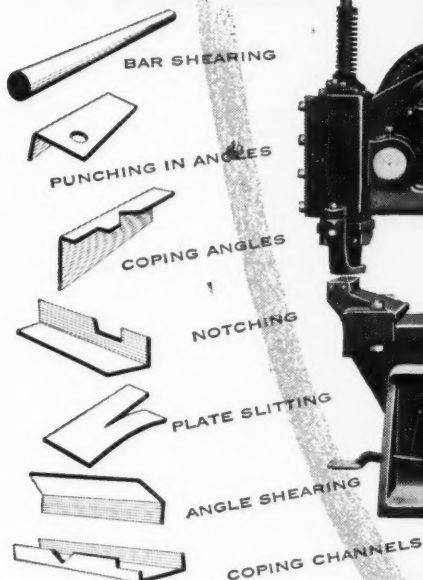
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crease the acid content, be restricted.

Magnesium alloys must be heated to their melting points before they will ignite. Roughing cuts and medium finishing cuts produce chips of such a size that they are not readily ignited, but fine cuts produce chips which may ignite. Stopping the feed and letting the tool dwell before disengagement, and letting the tool or tool holder rub on the work will also produce extremely

fine chips; and, consequently, these practices are avoided.

Other factors tending to increase the fire hazard are high cutting speeds, extremely fine feeds, dull or chipped tools, improperly designed tools, and poor machining techniques. With sharp cutting tools, it is necessary to use a feed of less than 0.001 in. and cutting speeds in excess of 1000 feet per minute to create a serious fire

hazard. Even under the most adverse conditions (that is, with dull tools and fine feeds) the fire hazard is very slight at speeds below approximately 700 feet per minute. Sand cast surfaces, oxide inclusions, and ferrous inserts which will cause sparks when hit by the cutting tool, increase the possibility of fire.

General precautions observed to minimize the possibility of fire are as follows:

General Precautions

(1) Magnesium chips and dust are not allowed to accumulate on the machines or clothing of the opera-

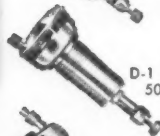


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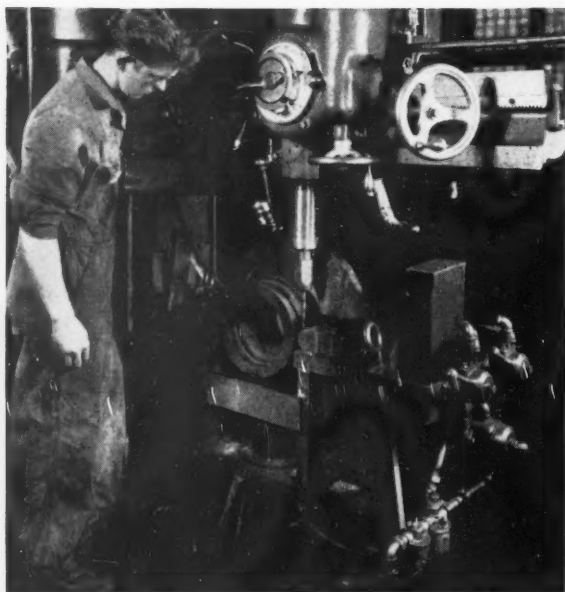
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tors. Dust and chips are removed at frequent intervals and stored in clean, plainly-labeled, covered metal cans.

(2) Machines and adjacent floor areas are kept reasonably clean because cluttered and dirty floors are fire hazards.

(3) An adequate supply of recommended fire extinguishers are within reach of all machine operators.

(4) No smoking is allowed in the vicinity of magnesium machining

Magnesium alloys are probably the easiest of all high-strength commercial alloys to bore or drill, but their most effective use in this connection sometimes necessitates the use of modified cutting tools.

operations.

(5) Open flames and sparks are kept away from finely divided magnesium at all times.

Incidentally, magnesium fires can be readily extinguished with clean, dry, unruined cast iron chips or graphite powder. The extinguisher is first sprinkled over the burn-

ing magnesium to provide a layer of material at least $\frac{1}{2}$ in. deep. Then active fires on combustible surfaces are shoveled into an iron container.

Lathe set-ups, with due consideration of the more careful chucking of magnesium and slight differences in tool design, are similar to those used for brass or steel. It is important in all types of lathe tools that the relief angles be sufficiently large to eliminate rubbing of the tool flanks. Rake

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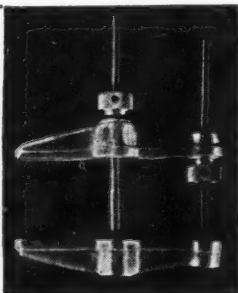
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angles may vary considerably, but best results are usually obtained on high-speed steel tools with side and back rake angles of 0 to 15 degs. Carbide tipped tools, however, should have slightly smaller rake angles in order to provide more support for the cutting edge. Forming tools usually have the back rake angle reduced to approximately 0 to 8 degs. to eliminate chatter. Side and end cutting edge

angles may be varied widely to suit the particular job, but side cutting edge angles above approximately 40 degs. are apt to cause chatter. Nose radii should be kept small to avoid rubbing on the end tool.

A wide range of cutting speeds, feeds, and depths of cut are possible in turning and boring magnesium. Depths of cut as high as 0.500 in., and feeds from 0.003 to 0.200 in. are being

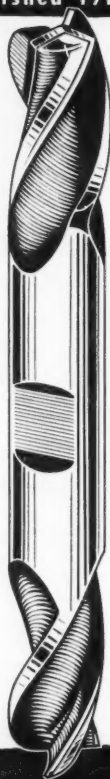
used commercially. The depth of cut, depends on the amount of stock to be removed, but for all practical purposes any depth of cut can be taken. Heavy feeds provide a very quick means of removing metal but do no give the best surface finish. For good finish, tool feeds rarely exceed 0.0025 inch. Extremely fine cuts are avoided wherever possible inasmuch as they tend to heat the work more than heavier cuts. The cutting speeds for magnesium vary from approximately 150 to 5000 feet per minute. Selection of the cutting speed depends upon many factors,

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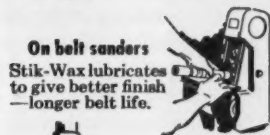
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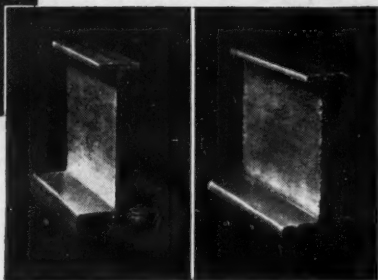


On taps

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but in most cases the allowable speed exceeds the maximum speed of the machine tool. Table III presents general recommendations for determining

tions from the recommended tool shapes are made if sharp cutting edges and proper relief angles can be used.

Inasmuch as the maximum cutting

Table III

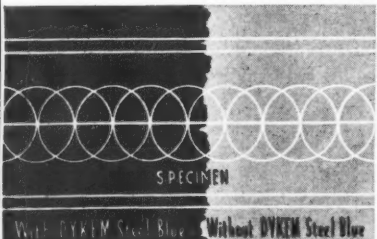
PRACTICAL CONDITIONS FOR MACHINING MAGNESIUM ALLOYS			
Operation	Speed, fpm	Feed, ipm	Depth of Cut, In.
Roughing	300 to 600	0.030 to 0.100	0.500
Roughing	600 to 1000	0.020 to 0.080	0.400
Roughing	1000 to 1500	0.010 to 0.060	0.300
Roughing	1500 to 2000	0.010 to 0.040	0.200
Roughing	2000 to 5000	0.010 to 0.030	0.150
Finishing	300 to 600	0.005 to 0.025	0.100
Finishing	600 to 1000	0.005 to 0.020	0.080
Finishing	1000 to 1500	0.003 to 0.015	0.050
Finishing	1500 to 2000	0.003 to 0.015	0.050
Finishing	2000 to 5000	0.003 to 0.015	0.050

depths of cut, feeds, and cutting speeds for magnesium. The general rule is to turn and bore magnesium as fast as the machine tool, fixtures, and work will allow.

Shaping and Planing

Practically the same tool designs and machining recommendations as outlined for turning and boring are applied to the shaping and planing of magnesium. When necessary, devia-

speeds in these operations are much lower than the recommended cutting speeds, economies in operation are usually effected through use of heavy feeds and depths of cut which are made possible by the low power required to machine magnesium. Cutting fluids are usually unnecessary in shaping and planing operations inasmuch as the cutting speeds used do not create a fire hazard and only a small amount of heat is developed. The



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The image features a central illustration of the Hamilton No. 1 Precision Small Gear Hobber, a heavy-duty industrial machine with a large flywheel and a complex gear mechanism. To the left and right of the machine are two vertical strips, each containing several different types of precision gears of various sizes and shapes. Below the machine is a dark rectangular box containing the Hamilton Tool Company logo, which includes a profile of a person's head and the company name in a stylized font. Below the logo, the address "828 SO. NINTH STREET • HAMILTON • OHIO • U • S • A" is printed in a smaller font.

rigidity of the work piece and clamping fixtures as well as the possibility of inducing machining stresses in the work are the limiting factors in the maximum possible size of cut. To prevent marring the surface on finishing cuts, the tool block is lifted on the return stroke of the ram to avoid the possibility of dragging the tool over the work surface.

Milling

Milling operations provide an opportunity to take full advantage of the machining characteristics of magnesium. Heavy feeds and extremely high milling speeds can be used to remove metal rapidly with excellent surface finish resulting.

High-speed steel can be used satisfactorily on all types of milling cutters, but cemented carbides are superior for inserted tooth face mills and fly cutters which operate at high speeds. Slab, side cutting, and straddle mills are coarse-toothed with $\frac{1}{2}$ to $\frac{1}{3}$ as many as in mills for steel. Inserted blade face mills have very large chip spaces to provide for ready removal of the large volume of chips produced. Simple and multiple tooth fly cutters perform exceptionally well on magnesium alloys.

Negative face rake angles are sometimes used on face mills to throw the chips out of the cutter. Helical slab

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 to table 19½"
 Spindle speeds (12) 53-1250 RPM
 Equipped with anti-friction
 bearings.

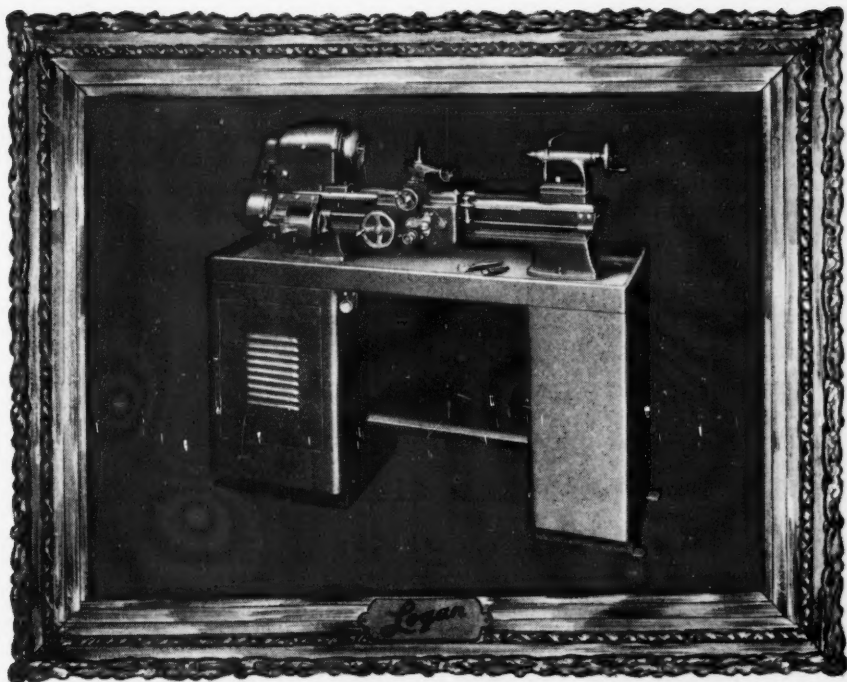
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mills should have a helix angle of approximately 45 degrees.

Cutting speeds up to 9000 feet per minute are being used in milling magnesium alloys. These extremely high speeds emphasize the possible reduction in machining time which can be effected through the use of magnesium. The high speeds which can be used in milling operations do not re-

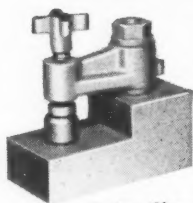
sult in a serious fire hazard with magnesium inasmuch as the method of cutting usually does not allow the tool to dwell or rub on the work.

The full depth of cut can usually be taken in one pass, but for finish cuts the depth should not be less than 0.003 to 0.004 inch. Heating of the work is minimized by heavy roughing cuts followed by fine finish cuts at maximum cutting speed.

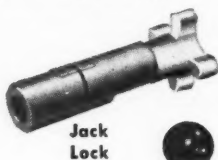
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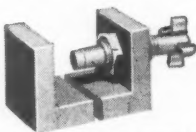
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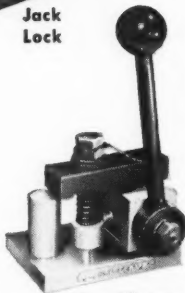
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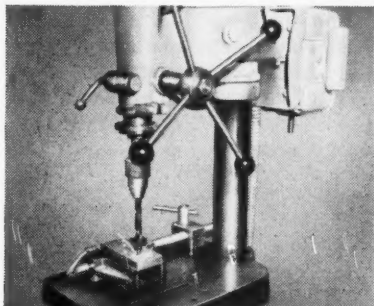
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Drilling

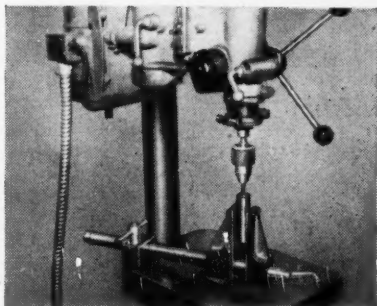
Best results are usually obtainable in the drilling of magnesium and magnesium alloys if the drills are correctly designed for the type of drilling being performed. Such drills include sheet-metal, shallow-hole (depth less than five times the drill diameter), and deep-hole types.

Magnesium sheet can be drilled with a sharp, standard 118 deg. point angle drill, but for high production of accurate holes with a good finish and minimum burr, a slightly modified drill is used. It has a point angle reduced to approximately 60 deg. to prevent

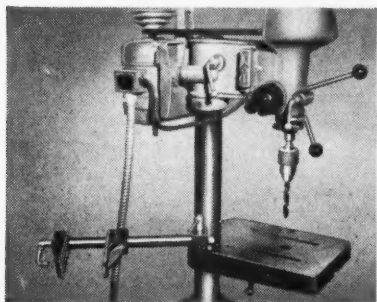
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"walking" and to minimize thrust or abrupt changes of thrust when breaking through. The chisel edge angle is within the range of 120 to 135 degrees. The web is thinned and the ends of the cutting edges are rounded. A thin web at the point helps to center the drill and reduce thrust, while the rounded corners provide a smooth finish and reduce burrs. A helix angle of approximately 10 deg. prevents the

work from climbing the drill on the break-through.

Drilling holes in magnesium to a depth of less than five times the drill diameter presents few difficulties. Consequently, only a few drill modifications are necessary to secure maximum production of high quality holes. The standard helix angle of approximately 25 deg. is satisfactory but may vary from 10 to 30 degrees. Highly polished

flutes are employed to facilitate the flow of chips out of the hole, especially if low helix angle drills are used. Standard point angles of 118 deg. and chisel edge angles of 120 to 135 deg. which give a result angle of approximately 120 deg. provide the best cutting action. Point angles are reduced to as little as 70 deg. and spur points are added to eliminate any spiralling in the drilled hole. Rounded corners give accurately sized holes and better surface finish. It is extremely important, no matter what type drill is used, that the cutting edges be kept sharp.

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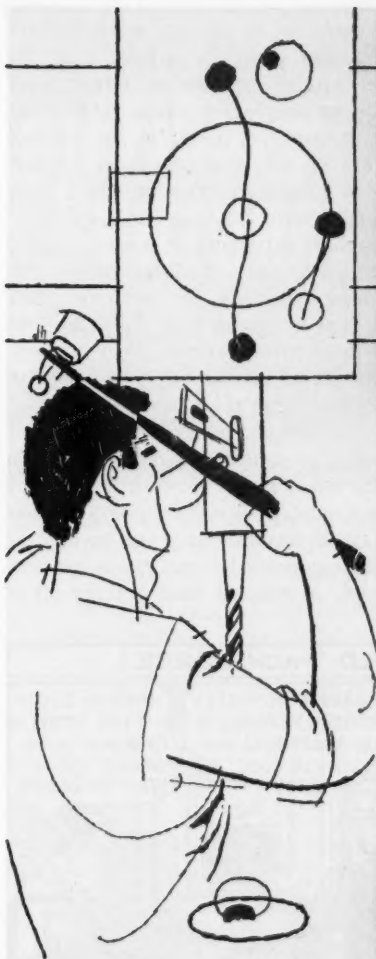
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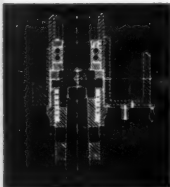
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ARE YOU **HAMMERING** YOUR DRILL TOOLS INTO THE SCRAP PILE?

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You don't need attachments—it's all done without special chucks, using standard taper shank tools.



THE TOOL EJECTOR is another "first" from Fosdick, design leader in drilling machinery, and first to apply hydraulics to Radial Drill controls. Remember, only Fosdick can equip its drills with the Tool Ejector.

FOSDICK

Dull drills will give poor surface finish, undersized holes, and burrs; also, they tend to heat up the work.

Drilling deep holes in magnesium produces an appreciable quantity of chips which must be guided out of the hole through a considerable length of drill flute. High-helix drills (40 to 45 deg.) do this satisfactorily. Flutes are opened and polished to provide larger chip spaces and smooth surfaces to aid in chip removal. The web of the drill has a constant thickness for its entire length to provide large flutes at the top as well as at the bottom of the drill. Low helix angle drills or drills with unopened flutes may cause chips to jam, resulting in high torques and poor surface finish, and have to be withdrawn frequently to clear the flutes—whereas a high-helix drill can penetrate to 25 times the drill diameter in a single pass.

Chisel edge angles of 135 to 150 deg. are essential to provide good surface finish and minimize spiralling in the hole. Angles smaller or larger than those recommended cause difficulties due to improper relief at the cutting edge and the lack of proper centering of the drill. The standard drill point angle of 118 deg. has been found to be most satisfactory. A spur or pilot point ground at the center of the drill reduces spiralling or "run-off". The fact that this type drill can be used to drill holes up to 25 times the drill diameter without withdrawing the drill to clear the flutes is of particular importance in the use of multiple spindle or automatic drilling machines. Special drills such as oil hole or rifle drills which employ high pressure oil to clear the flutes of chips may also be used to drill deep holes if light feeds are employed. A mineral base cutting oil of

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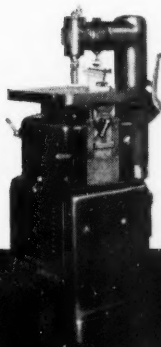
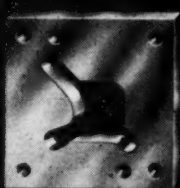
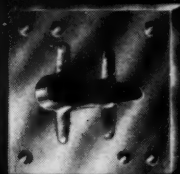
BOYAR-SCHULTZ No. 1 Profile Grinder



A Bench model with Spindle speed of 20,000 R.P.M., Boyar-Schultz No. 1 Profile Grinder is a rapid Stock remover.

An ideal machine tool for grinding and fitting irregular inside and outside contours and profiles such as die clearances and other many grinding jobs that would otherwise require time consuming set-ups. A real time-saver, performing in minutes many jobs that formerly required hours.

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For grinding and fitting large dies and punches such as forming dies for refrigerators, tables, sanitary ware and other large work. Spindles turn at 10,000 R.P.M. Accommodates wheels $\frac{1}{4}$ " to 3" diameters.

BOYAR-SCHULTZ CORPORATION

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the type previously described reduces torque and facilitates the drilling of extremely deep holes.

Drill jig bushings clear the work by a minimum of $1\frac{1}{2}$ times the drill diameter to reduce the effective depth of holes. Extreme care is taken to avoid chipping or nicking of drills in the bushings, inasmuch as dull or nicked tools will not work satisfactorily.

The maximum speeds obtainable on drilling equipment can be used for magnesium alloys. The speeds used in aircraft plants are in the range of 75 to 400 feet per minute, but these are optional.

The feeds used in drilling magnesium are heavier than those for other metals in order to secure proper chip formation. Small drills work best with

light feeds, as they give slightly coiled or ribbon-like chips which feed out through the drill flutes without jamming. Heavier feeds on large drills prevent jamming of the chips.

Reaming

Reamers for magnesium alloys have relatively few flutes—those under one inch in diameter having four flutes, and those over one inch in diameter having six flutes. The flutes may be straight (0 deg. helix angle), or they may have a negative helix angle of approximately 10 degrees.

Margins are narrow to minimize springing of the metal and to

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obtain accurately reamed holes, but in some cases no margins are used to secure a free cutting reamer. Reaming feeds for brass and steel have been satisfactorily utilized, but these were optional.

A definite cut is taken with the reamer, for otherwise the metal will compress, resulting in an undersized hole with poor surface finish. Approximately 1/32 in. on a diameter is sufficient stock, because heavier cuts can jam the flutes with chips. Cutting speeds vary from 100 to 400 feet per minute, the maximum speeds being established by the machine tools. High cutting speeds and medium feeds provide the best finish and most accurate holes obtainable.

Tapping

Threads which are not held to extremely close tolerances may be tapped in magnesium alloys with standard tools, but high production and the close tolerances necessary for Class 3 and 4 threads require the use of special taps. The latter are ground high-speed steel, straight, and helical fluted concentric taps. The use of a heel rake and the elimination of radical thread relief provide a cutting action on backing out which prevents jamming of the chips and provides a clean, accurately-tapped hole. If a tendency is observed for a tap to cut oversize, the rake angle is decreased.

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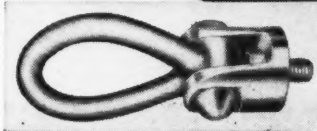
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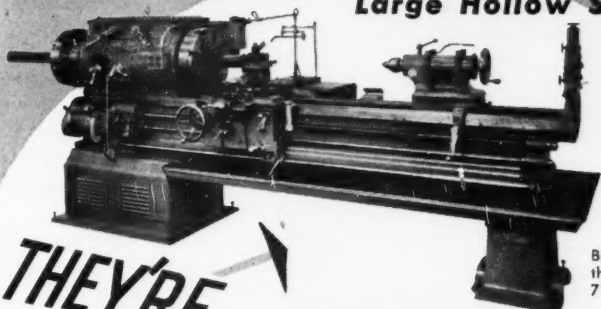
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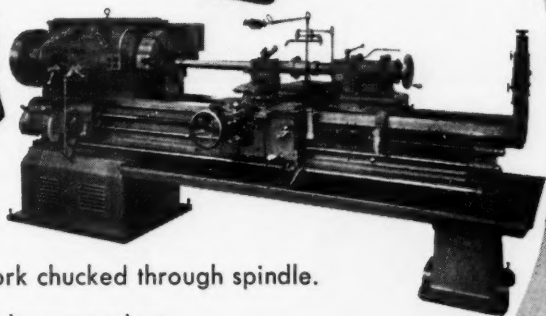
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mal are also used. Two-fluted taps are specified for holes up to $\frac{1}{4}$ in. diameter; three flutes, for holes from $\frac{1}{2}$ in. to approximately $\frac{3}{4}$ in.; four flutes, for larger holes. Gun taps, interrupted thread taps, and other special tools have been used with success on certain jobs, but not for all general purposes. Tapping speeds of 75 to 200 feet per minute are commonplace.

Standard tapping heads and machines work satisfactorily on magnesium alloys, but experience has shown that machines utilizing a lead screw to establish pitch produce more accurate threads than any other type of tapping equipment.

Threading dies have approximately the same cutting angle as taps, and the lands are as narrow as possible to provide adequate chip clearance. Self-opening dies give threads with maximum smoothness, and the cutting angles of thread chasers approach those used on turning tools except for the fact that the rake angle is somewhat larger. Particular attention is paid to the sharpness of the cutting edges and the relief angles. Threads are chased in magnesium alloys at speeds up to 1000 feet per minute.

Editor's Note: This article will be concluded in the May issue.

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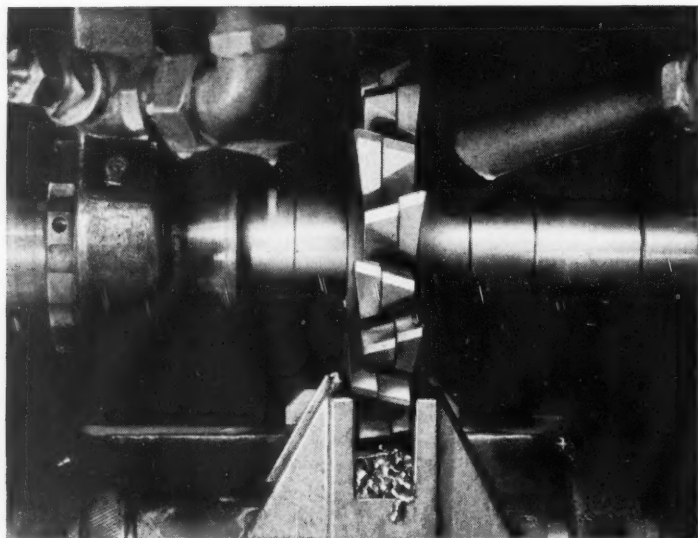
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Barber-Colman Cutter Engineers have developed and patented* an Interlocking Staggered Tooth Cutter which provides greater efficiency for deep slotting operations. Its advantages have been proven through several years of actual field service, and all applications have shown a marked increase in efficiency over any other design. These cutters reduce tooth breakage, increase tool life and permit the use of greater feeds and speeds. They work equally well in steel or soft non-ferrous materials, and are essential for operations where the depth of cut exceeds the width of cutting face.

*Patent No. 2,230,662

The outstanding patented feature is the arrangement of the teeth which provides a continuous cutting face across both sections. To produce this type of face, the entering section of the tooth is always slightly ahead of the trailing portion so that there is no chance of blocking the chip flow. This eliminates chip congestion and permits a free flow of chips across the face of the cutter. In effect, it provides all the features of a solid cutter plus the added advantage of accurate adjustment for the width of the slot. This type of chip action is available only in the Barber-Colman design.

DESIGNERS OF STANDARD AND SPECIAL

INCREASES FEEDS AND SPEEDS

Feeds and speeds which would normally stall conventional type cutters can often be used with this new design. The depth of cut may be as great as the depth of the cutter hub without impairing the cutting efficiency of the cutters. Absence of chip accumulations reduces cutting temperatures to allow increased feeds and speeds.

LENGTHENS TOOL LIFE

The improved design eliminates any obstruction to the free flow of chips across the cutting face. Consequently, chip congestion found on conventional cutters of herringbone design is eliminated. Because of this chip action, cutting edges will produce many more pieces per sharpening. The absence of chip congestion also removes a major cause of tooth breakage.

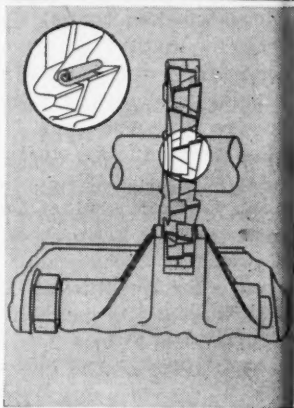
GUARANTEES ACCURACY

Through the interlocking feature, accurate slots can be milled throughout the life of the cutters. Conventional cutters rapidly become undersize with sharpening and must be discarded or used for other work. Interlocking cutters however, can be resharpened indefinitely. By using shims between the two sections, the width of cut can be accurately controlled for the life of the cutters.

The interlocking design also has flexibility for using a single cutter on several widths of slots. Slots wider than the cutting face can be made by shimming the two sections to the desired dimension. Barber-Colman cutters provide a greater range of widths because of the extra depth of interlock.

MADE TO ORDER

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M E T A L C U T T I N G T O O L S S I N C E 1 9 0 8

Designing Clearance Recesses to Fit the Job, Part III

Recesses for threaded parts and other miscellaneous components are discussed in this, the last article of the series.

By FRED ROGERS

THREADING clearance recesses, both internal and external, are more notoriously abused than any other type of recess. The designing engineer who has had lots of shop experience knows that this is true. The shop man who does the thread chasing and tapping knows the trouble that narrow recesses can cause. It is indeed very common to see clearance grooves as shown in Fig. 44 where no consideration is given whether the thread be a fine pitch of 24 or a coarse thread of 8 per inch. The so-called "standard" groove for fine threads is set at $\frac{1}{16}$ inch wide and $\frac{1}{8}$ inch wide for coarse pitches as in Fig. 44.

The width of the clearance recess for the grinding operation mentioned in Part 1 of this series of articles was to be such that a diameter of constant dimension for the entire length of the cylindrical portion resulted. In the case of threads, the last thread adjacent to

the recess is to be full depth; that is, a perfect thread. If the clearance recess is too narrow, there will be one or two imperfect threads and binding with the mating piece results when it is assembled. This is because the thread chaser has a throat of determined angle. It is of utmost importance that the draftsman remember this. The angle of throat determines the width of the clearance groove that must be cut on the shaft or spindle. Assuming that the die chaser approaches the shoulder within $\frac{1}{16}$ inch as a minimum, an angular line is started down and back from a point approximately $\frac{1}{32}$ inch above the top of the thread. See Fig. 45. The angle may vary from 10 to 30 degrees. It may be less but never more if a single pass of the die is to cut perfect threads into the clearance recess.

If the condition of the work is such that only a few threads are available because of limited length, the width of recess might be made narrower. However, a chaser having a throat of from 35 to 45 degrees will be necessary. Because the leading thread in this

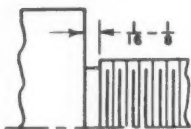


Fig. 44 — Design for recess on externally threaded part.

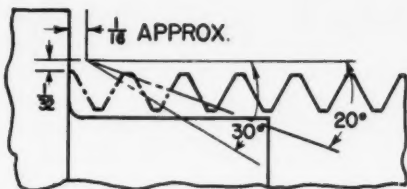


Fig. 45—The angle of the thread chaser throat determines the width of the clearance groove.

wide angle throat will have to do excessive work, the chaser will require sharpening at more frequent intervals. Of course, a small angle throated chaser may be used for roughing, followed by a wide angle throated chaser for finishing the perfect threads adjacent to the recess. Because two operations are necessary in such a setup, production will be slowed up more than 50 per cent. Wherever it is possible, a recess as wide as possible should be used, one that accommodates $2\frac{1}{2}$ to 3 threads.

When a thread is to be cut on a thread miller using a single tool as shown in Fig. 46, a comparatively narrow recess can be used. If, for example, the cutter is $\frac{1}{16}$ inch in thickness and $\frac{3}{8}$ inch between cutter and work shoulder is allowed, the center of the cutter widthwise will be $\frac{3}{16}$ inch from the shoulder. If the right hand side of the recess illustrated is chamfered to 60 degrees with the axis of the work-piece, the recess need only be slightly wider than $\frac{3}{16}$ inch as shown. However, in this instance, it is safer to allow $\frac{1}{4}$ inch if conditions otherwise warrant.

The same principle in Fig. 45 applies to internal threads. See Fig. 47. If the recess is to be machined in contrast with a cored groove, it may be $\frac{3}{8}$ to $\frac{1}{16}$ inch larger in diameter than the o. d. of the thread or half that per side as shown. The width A may be approxi-

mately the same as shown in Fig. 46. This applies mostly to threads that are chased with a single point internal threading tool. But if the thread is to be cut with a tap, several points must be considered. The taper of a tapered or first tap is usually so long that it will be impossible to thread to a shoulder as illustrated without leaving some imperfect threads at the bottom of the hole. This necessitates the use of a plug or second tap either for the first or second operation. If used in the first operation, the leading threads on the tap do all the work. If a clearance recess must, of necessity, be quite narrow, a third or bottoming tap is required. In this case at least two taps are required.

Large tapped holes as well as those that are bored or reamed, in castings, can be finished into a cored recess when found advisable. This sometimes eliminates a deep boring or recessing operation. The cored groove must be of ample diameter in case the bored hole before threading comes eccentric to the cored opening. The width of the cored recess is usually made somewhat greater than that of a machined recess.

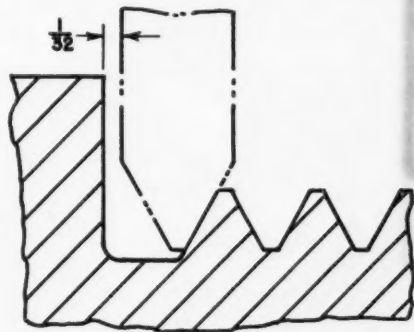


Fig. 46—When a thread is to be cut on a thread miller using a single tool, a comparatively narrow recess may be used.

An error and omission frequently seen on assembly and detail drawings is in the use of machine screws for

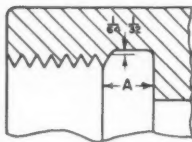


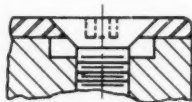
Fig. 47 — Design for recess on internally threaded part.

holding thin pieces such as sheet metal to castings. The remedy is shown in Fig. 48. The two pieces should not be countersunk together and then expect a tight holding job on the part of the screw. The casting or tapped part should be counterbored to accommodate the lower part of the screw head where it joins the threaded body. Some machinists countersink both pieces simultaneously, disassemble and re-countersink the hole in the casting

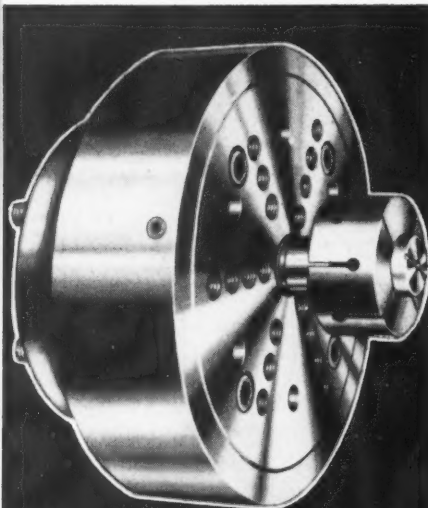
enough to relieve the screw head. This sometimes throws up a burr on the first thread of the tapped hole that must be removed before assembling again. Many consider the method shown as the most satisfactory way to recess for a machine screw head. This method affords the screw excellent clamping power as well as prevention against backing-out caused by vibration because the screw head tends to spring the sheet metal inwards at the counterbored opening.

Many of us who work or have

Fig. 48 — Design of recess recommended for use when fastening thin metal sheet to casting by means of machine screws.



worked in the machine shop have at one time or another used a washer with a flat base that would not hold,



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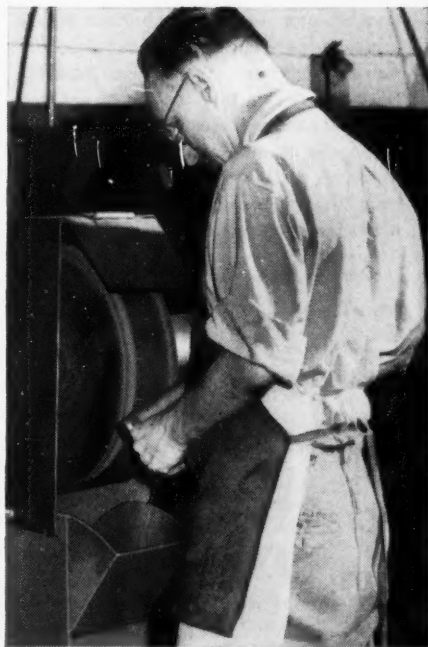
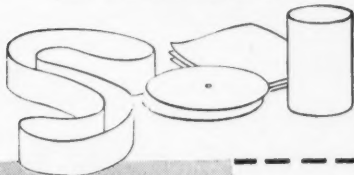
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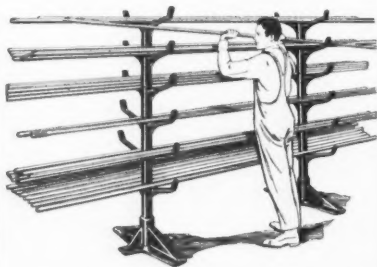
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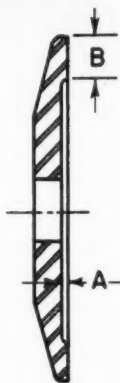
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Fig. 49—Design of flat washer which provides effective holding surface.



especially so if the washer was too thin or too large in diameter. Pressure against the washer tended to bow the flat contact surface so that only the inner edge around the hole was holding. Fig. 49 shows a most successful shape of washer. The principle applies not only to washers but to covers, flanges, bases and other parts. The theory, of course, is that the pressure is distributed at the outermost surface, so that the holding leverage is most effective. Work held laterally on an arbor is a good example. However, the subject shown is a protection flange for holding a grinding wheel on a spindle. The "American Standard Safety Code for Abrasive Wheels" has established a series of sizes whereby grinding wheels from 1 inch to 36 inches in diameter are held by such flanges. Taking as an example a 3-inch o. d. flange, the radial width of the bearing surface **B** is $\frac{1}{4}$ inch minimum and $\frac{1}{2}$ inch maximum. A 6-inch

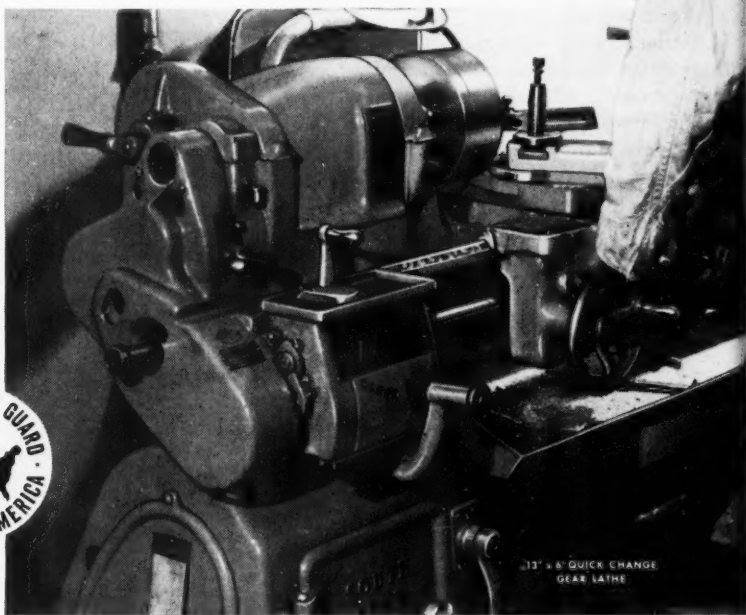


Fig. 50—Drawing illustrating design of approved grinding wheel flange.

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POWER CROSS FEEDS: 480006 to .0312"

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o. d. flange has dimension **B** as $\frac{1}{2}$ to 1 inch and a 12-inch o. d. flange a **B** dimension of 1 to 2 inches. The flanges

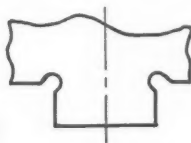


Fig. 51—Design of recesses for aligning key.

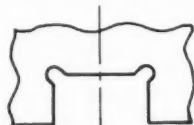
are stiff enough that the depth of recess **A** for all size is $\frac{1}{16}$ inch only. A thin blotter paper washer or gasket between each flange and the grinding wheel is used.

Another type of grinding wheel flange approved by the same organization is shown in Fig. 50. It is used for wheels having large holes. The specification reads that the wheel flanges "shall be recessed so that there will be no bearing on the sides of the wheel

within $\frac{1}{8}$ inch of the hole." The recess is half round having $\frac{1}{16}$ inch radius and depth. A blotter washer also is used between the wheel and the two flanges.

The locating or aligning key or guide of work holding fixtures, vises and machine attachments or other auxiliary equipment sometimes is made integral with the base. The bottom surface of the base and the sides of the key are ground for accuracy. Such a key is shown in Fig. 51. A half round nose cutter, either for planer,

Fig. 52—Design of recesses in base of locating key of work holding fixture.



shaper or milling machine approaches the corner at 45 degrees to cut the clearance recess as shown. At times

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CHUCK: #6A Jacobs key type capacity 0 to 3/8".

TABLE: 10" x 12 1/4" machined working area.

BASE: 10" x 9" machined working area on Bench models. 11" x 9" on Floor Models.

SPINDLE: Six spline full floating type, 5/8" diameter, male #33 Jacobs taper for No. 6A Jacobs Chuck, or #1 Morse taper socket (optional).

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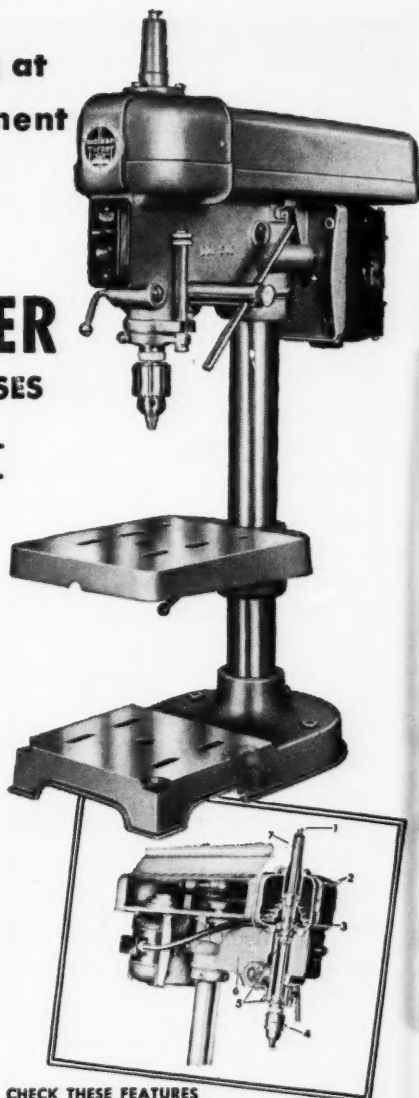
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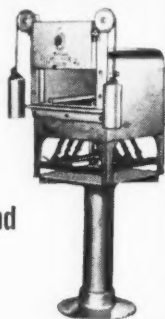
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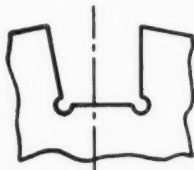
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the reverse takes place in that a slot is milled into the base as illustrated in Fig. 52, the sides and bottom of which

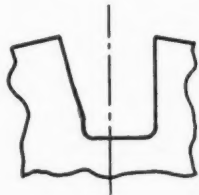
Fig. 53 — Clearance recesses facilitate grinding the sides of locating slots in indexing plates.



are ground. A similar cutter is used at the same angle. If the width of the keyway is narrow or deep or both, it might be difficult to clear the outer corners if a milling cutter is used especially at 45 degrees. The corner grooves must then be shaped or planed.

Indexing plates with locating slots engaged by a spring actuated lock bolt usually have clearance recesses to facilitate grinding the sides of the slots. In Fig. 53, holes are drilled at the corners as shown so that the grinding wheel clears at the corners. As many such designs of index plates are comparatively thin, and because they might be heat-treated, the drilled holes prevent stress concentrations and avoid the possibility of heat cracks. In Fig. 54, another method of clearance recessing is shown, where a square cutter with radiused edges is sunk

Fig. 54 — Illustration showing method of recessing locating slots in indexing plates.



into the periphery of the plate to such a depth that the grinding wheel runs past the tapered surface and into the

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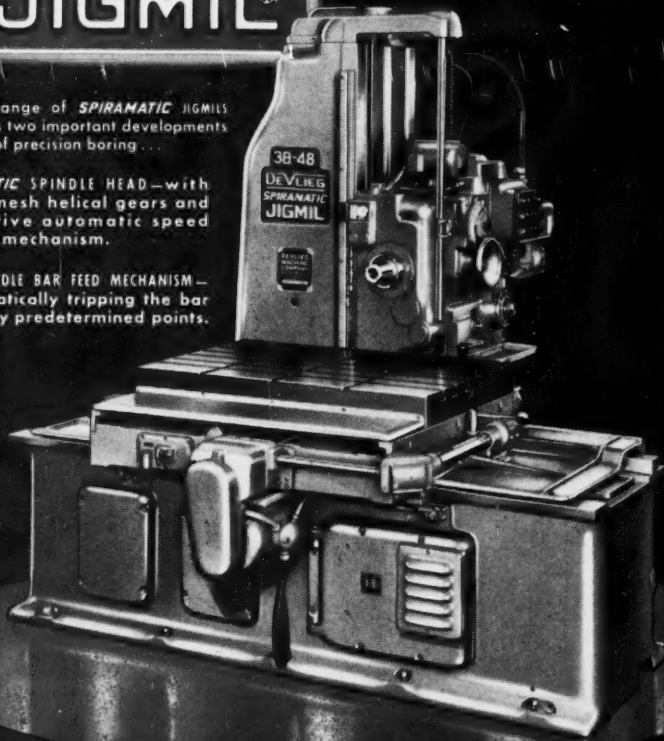
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square cut. The straight side is ground down below where the end of the lock bolt comes to rest.

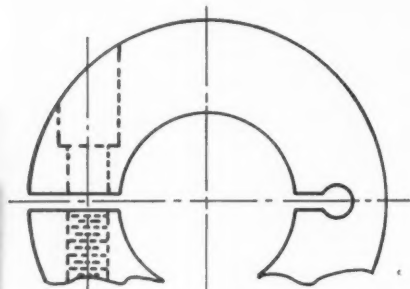


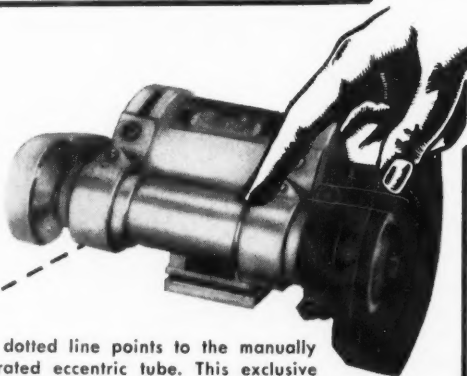
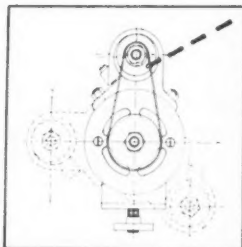
Fig. 55—Drilled hole in locating collars, adjustable stops, and similar workpieces serves as a clearance recess.

An example of a drilled hole which serves as a clearance recess of a different nature is illustrated in Fig. 55. In a typical application. This design

may be applied to locating collars, adjustable stops, gages, and a host of other similar pieces. This example is shown to point out its desirability over a square ended groove or even where the slitting cutter is radiused half round at the edge. The hole is at least twice as large as the cutter width. As in the lock bolt plate in Fig. 52, stress concentrations will not occur. Some say that the hole can be drilled closer to the periphery of the piece without impairing the strength but increasing the spring action for tighter clamping. This design applies equally whether the bore is plain or threaded.

In Fig. 56 a clearance recess is illustrated for an internal gear, especially where surface A acting as a thrust face, is ground. The gear shown is made of steel. The dimension B may be $\frac{1}{4}$ inch minimum or larger for clear-

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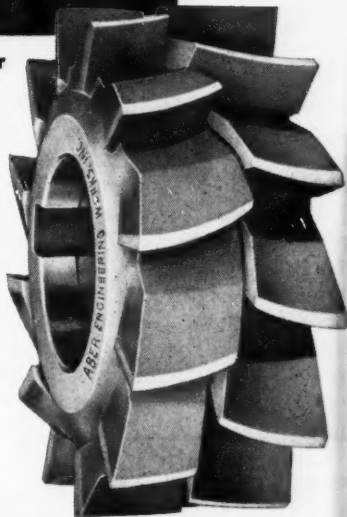
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Here Are the Facts



OPERATION DATA

MACHINE: U. S. Multimiller

TOOL: Aber "Curved Tooth" right and left hand shear side milling cutter. 3" x 3/8" x 1 1/4"

MATERIAL: Bronze Turbine Blades.

COMPARATIVE PERFORMANCE

	ABER CUTTER	STANDARD CUTTERS
S. F. M. Speed:	400sfm	400sfm
Feed per Rev.:	16" per min.	12" per min.
Depth of Cut:	1/4"	1/4"
Pieces per Grind:	20,000 and still going strong	3,000 to 4,000 maximum

You too can profit by applying Aber "Curved Tooth" milling cutters for increased production and reduced rejections due to off-tolerance, unsatisfactory finish milling operations. Remember every Aber Tool has the exclusive, patented "Curved Tooth" design providing chatterless, smooth cutting action.

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ance of the gear cutter and the depth only sufficient for clearance of the cutter teeth. On gears of externally cut teeth when such gears are made

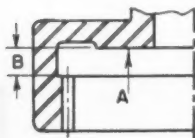


Fig. 56—Drawing illustrating clearance recess for an internal gear.

in the form of a sliding cluster (not shown), the width of clearance recess between the gears should be a minimum of $\frac{1}{4}$ inch.

When mounting pulleys, sheaves or gears on a motor shaft, the square key should be held by a headless set screw through the hub. The screw not only holds the pulley on the shaft but being drilled and tapped into the keyway in the pulley, clamps the key to the bottom of the motor shaft keyway simul-

taneously. As sometimes occurs, a cup point set screw is used instead of a screw having a flat point either steel or brass tipped. The cup point bites into the soft steel key which throws up a burr that hinders ease of disassembly. In Fig. 57 a remedy is shown. The top groove allows clearance for the burr. If the key is narrow and the set screw large, the sides should be recessed also so there is no side swelling by the screw bite beyond the outer width of the key.

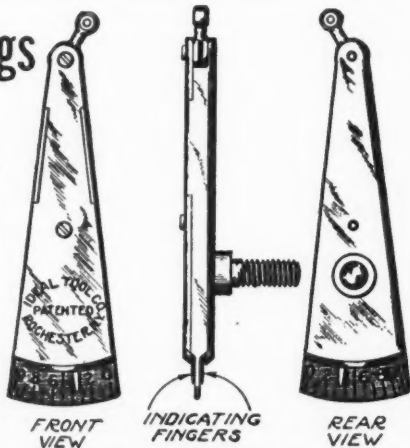
In closing, one other application of clearance recess that needs no illustration is that in the inside flanges of a flat belt pulley where the flanges are higher than $\frac{1}{2}$ inch. Many designers suggest relief on the inside surfaces of these flanges to within $\frac{1}{4}$ inch of the outside edge. The corner between the flange and the pulley belt

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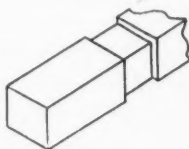
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surface, because it is often ground, must be grooved out also. Usually the belt is a little narrower than the distance between the clearance grooves.

Fig. 57 — Recess in key for shaft and hub provides clearance for burr which might be formed by cup point set screws.



Undoubtedly, there are other important uses for clearance recesses not included in this series of articles. However, it is felt that enough various types have been illustrated to help the reader apply them to his own particular design and shop problems.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



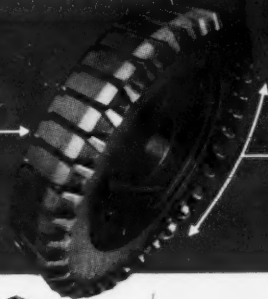
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Calculating Hole Centers of Bolt Circles

By M. O. KUHN

Chief Engineer, Electric Wheel Company

THE chart herewith shows a quick method for calculating hole centers of bolt circles of from 3 to 12

holes inclusive. This chart has been found especially helpful for use in connection with jig boring machines.

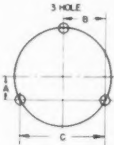
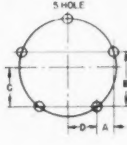
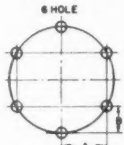
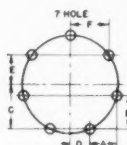
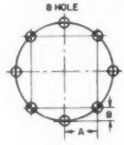
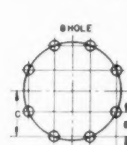
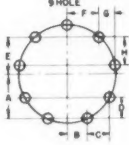
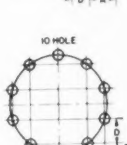
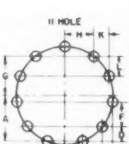
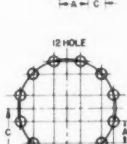

<p> $A = .25000 \times \text{DIA.}$ $B = .43302 \times \text{DIA.}$ $C = .86603 \times \text{DIA.}$ </p>		<p> $A = .18164 \times \text{DIA.}$ $B = .55902 \times \text{DIA.}$ $C = .40451 \times \text{DIA.}$ $D = .29389 \times \text{DIA.}$ </p>	
<p> $A = .43302 \times \text{DIA.}$ $B = .25000 \times \text{DIA.}$ </p>		<p> $A = .27048 \times \text{DIA.}$ $B = .33922 \times \text{DIA.}$ $C = .45049 \times \text{DIA.}$ $D = .21694 \times \text{DIA.}$ $E = .31175 \times \text{DIA.}$ $F = .39092 \times \text{DIA.}$ </p>	
<p> $B = .35355 \times \text{DIA.}$ $B = .14644 \times \text{DIA.}$ </p>		<p> $A = .27060 \times \text{DIA.}$ $B = .27060 \times \text{DIA.}$ $C = .46194 \times \text{DIA.}$ $D = .19134 \times \text{DIA.}$ </p>	
<p> $A = .46985 \times \text{DIA.}$ $B = .17101 \times \text{DIA.}$ $C = .26200 \times \text{DIA.}$ $D = .21985 \times \text{DIA.}$ $E = .38302 \times \text{DIA.}$ $F = .32139 \times \text{DIA.}$ $G = .17101 \times \text{DIA.}$ $H = .29620 \times \text{DIA.}$ </p>		<p> $A = .29389 \times \text{DIA.}$ $B = .09549 \times \text{DIA.}$ $C = .18164 \times \text{DIA.}$ $D = .25000 \times \text{DIA.}$ </p>	
<p> $A = .47975 \times \text{DIA.}$ $B = .14087 \times \text{DIA.}$ $C = .23700 \times \text{DIA.}$ $D = .15231 \times \text{DIA.}$ $E = .11704 \times \text{DIA.}$ $F = .25627 \times \text{DIA.}$ $G = .42063 \times \text{DIA.}$ $H = .27032 \times \text{DIA.}$ $K = .18450 \times \text{DIA.}$ $L = .21291 \times \text{DIA.}$ </p>		<p> $A = .22414 \times \text{DIA.}$ $B = .12941 \times \text{DIA.}$ $C = .48296 \times \text{DIA.}$ $D = .12941 \times \text{DIA.}$ </p>	

Chart for Calculating Hole Centers of Bolt Circles



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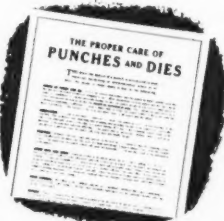
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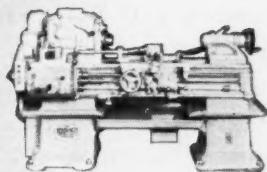
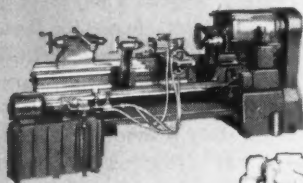
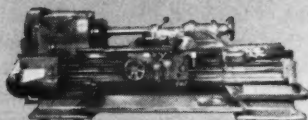
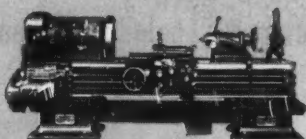
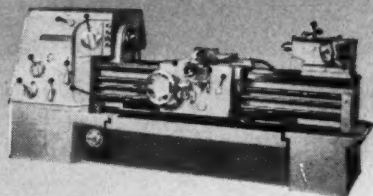
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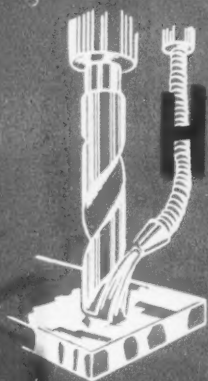
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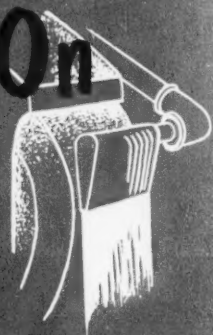
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Helpful Hints On Coolant Use



First of a series of articles in which the author offers some timely tips on how to obtain maximum coolant efficiency.

By JOHN E. HYLER

SO many variables enter the coolant picture that some are practically sure to be overlooked. Many times, after all the known variables relative to intelligent selection of a coolant have been carefully complied with, some unknown factor will enter the picture to upset the true basis of greatest possible efficiency. Many times when one fondly imagines he is doing all that could be expected, coolant-wise, some coolant engineer demonstrates that changing to a different fluid means a definite speed-up in production, a better finish on the work, or possibly both.

In the past, if one wanted high cooling properties primarily, he leaned toward selection of an oil and water emulsion. If he primarily desired a fluid that would give maximum lubrication between chip and tool face, with cooling properties secondary, he went to a compounded mineral oil with a chemically reactive nature. Within

that general schedule he considered different variables. Most mechanics knew that where steel was being broached, a fluid of very heavy body would be employed to aid in minimizing shock loads imposed on broach cutting edges. They also knew that tapping and threading would require a more viscous fluid than drilling or reaming. Tapping compounds were often separately purchased. They are separately provided.

Great progress has been made in the development of coolants which contain no oil, but which rely on chemical lubricity. In use, a chemical reaction takes place to form low-shear-strength compounds between the chip and the tool face. Remarkable results are being obtained with this type of coolant in various fields.

Trying Out New Coolants

Regardless of the fact that companies which continually seek methods

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of producing better coolants for specific uses do this work from the standpoint of extending their own markets, we should be grateful for their continued efforts. Within limits, it will pay to try out a new cutting fluid now and then on some given operation. One never knows when a coolant that will do a better job may be developed. Obviously such trials cannot be conducted with a degree of frequency that

will impair production. The best time to make a test is during a period when the shop is not badly rushed. There are countless cases where a change in coolant has resulted in unbelievable lengthening of the life of tool edges between grinds.

In some cases, definite mechanical advantage is derived from ability to actually watch progress of the cutting at all times. Transparent coolants

have at times been developed and used which permit a high degree of visibility. One transparent oil recently observed is especially good for use on screw machine work, its transparency allowing quick and accurate "miking" of parts. It has the additional advantage that it will not strain brass parts turned on the automatic, nor will it corrode the bronze gibs of the machine.

Heat is generated in the metal-cutting process in two different ways. One heat-generating source is the forcible deformation of the metal as it is removed by the tool and form-

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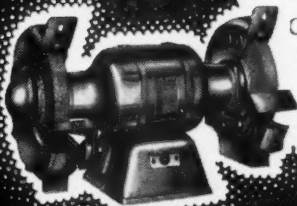
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ed into the chip. The other is frictional action of the chip sliding on the tool face. While there have been and are differences of opinion, authorities affirm that cutting fluid is drawn in between the chip and the tool face by capillary attraction. There are countless minute interstices between chip and tool face, due to the fact that neither incorporates a perfectly plane surface, when considered microscopically.

Importance of Thorough Circulation

Both the lubricative and cooling function of a cutting fluid drawn in between the tool face and the chip in this manner are highly important. It is evident that when a coolant layout or system is so small that the fluid becomes increasingly hot, or where the circulatory system is such that one portion of the coolant in the reservoir is processed through the system more often than the balance, the sys-

tem is robbed of much of its cooling efficiency. Where a relief valve is being employed to discharge into a coolant tank, it should be arranged to discharge into the reservoir at such a point that its force will operate to keep the coolant circulating in the tank. In this manner, heat taken up by the coolant will be uniformly distributed through the entire coolant supply.

If attention to proper circulation does not prevent the coolant from getting too hot, a larger coolant supply should be arranged. With many coolants, any pronounced rise in their tem-

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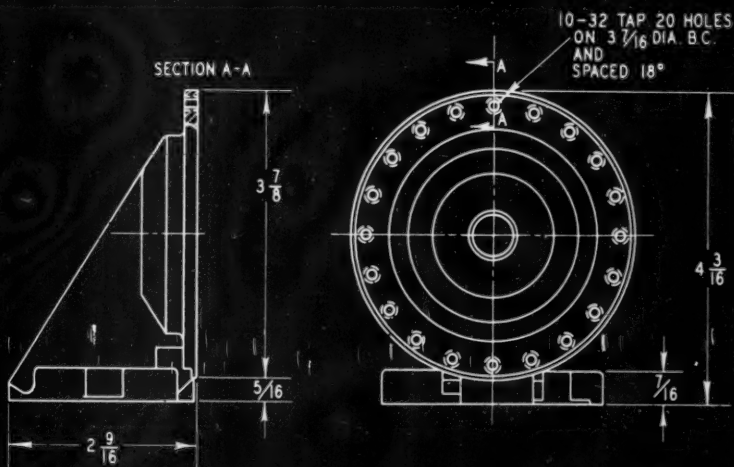
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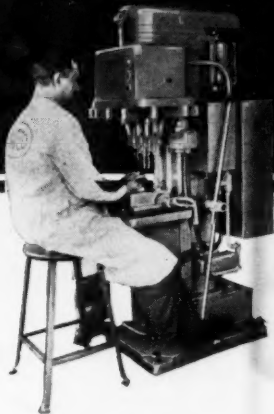
Operations—Tap Ten 10-32 Holes

Index

Tap Ten 10-32 Holes

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perature reduces their viscosity and robs them of a part of their efficiency. Another idea relative to maintenance of a suitably-low temperature in coolant is employing an auxiliary coolant refrigerating device. In fact, some coolant systems of portable type, quite widely used, embody a refrigerating function. While such refrigerating units are portable, they may be installed in such manner as to become an in-

tegral part of existing coolant systems.

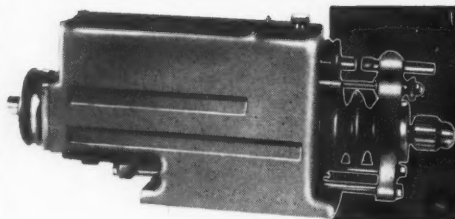
One special cooler for such fluids makes use of a highly efficient refrigerant, and is completely self-contained. It has been designed to maintain coolant temperature as low as 20 degrees below room temperature if desired. However, it incorporates an adjustable thermostat, so that one can choose a coolant temperature anywhere between this point and 10 degrees above room temperature.

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Direction of Coolant Flow

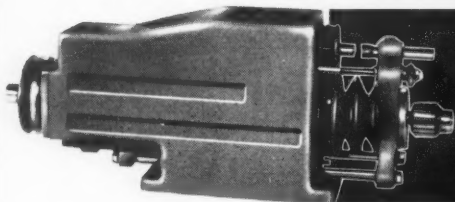
It is obvious that anything which may be done to get a larger proportion

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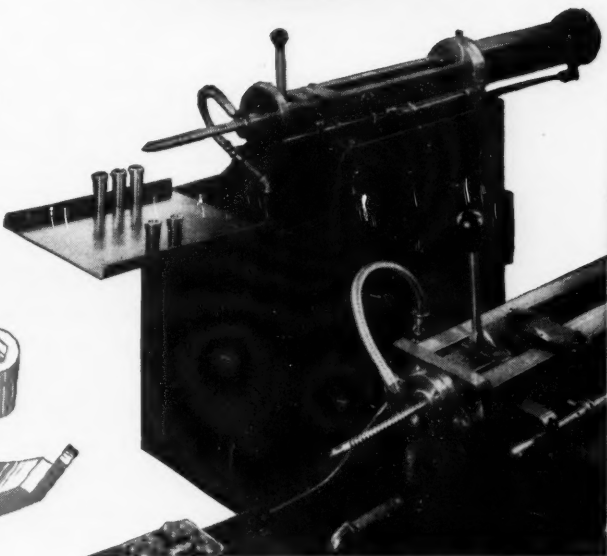
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of coolant in between the chip and the face of a tool, or between chips and cutting edges, is definitely in order. One fault of many operators (due to a misunderstanding of the manner in which coolant enters the vital frictional area) is that of directing coolant flow against the work just above the tool, evidently with the idea that it will have greater through-put in this way. Actually, coolant should be directed so as to find its way in be-

tween the tool edge and work at the point of cut.

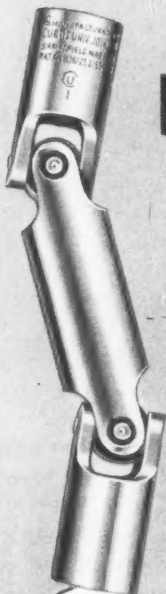
Evil of Intermittent Coolant Contact

When a situation of this kind arises, it can be very serious, coolantwise. Now and again the chip curls around in such a way as to momentarily interfere with coolant flow. During that instant, heat builds up unbelievably in the cutting edge. Then, the

coolant strikes the tool and the work again, resulting in sudden and spotty cooling. With first too-fast heating and then too-rapid spotty cooling of the carbide tip, thermal cracking of the tip with vastly shorter tool life may result.

From this, it is highly evident that proper chip-breaking is in such cases to be regarded as integral with correct coolant application. Wherever a rapidly-formed chip gets in the way of coolant flow, a way must be found to break the chip or otherwise to control it. Highly - efficient chip breaker

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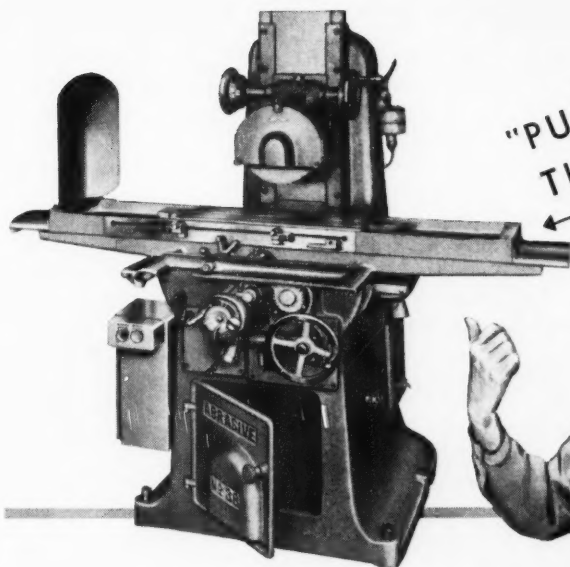
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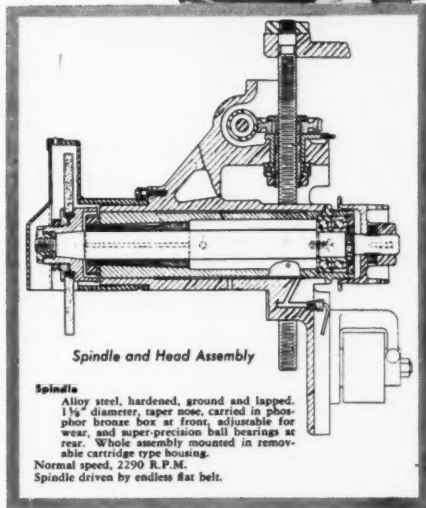
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grinders are available from different sources and are in use in many places. Proper coolant application must again be observed in grinding chipbreakers in these carbide-tipped tools.

Coolant is sometimes applied to the grinding face of the diamond wheel by keeping a wick in contact with it. In other cases, a spray-type device is employed for keeping the working surface of the diamond wheel wet. Plain

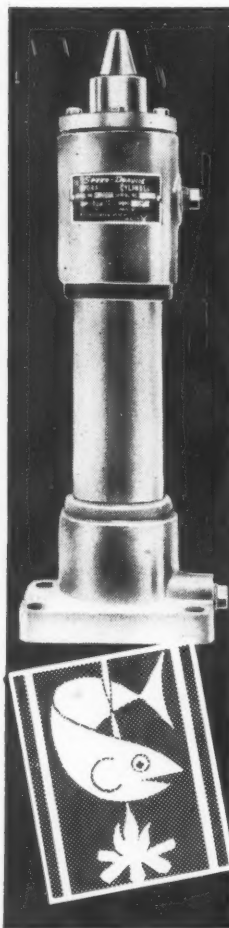
water, a mixture of soluble oil and water, or a 50-50 mixture of kerosene and carbon tetrachloride may be employed as a coolant when grinding chipbreakers. Though otherwise efficient, plain water is generally avoided because it causes the machine to rust.

Getting Coolant to Carbide Lathe Tools

Where lathe and similar work is being done with carbide

tools at high speed, it is very essential that the coolant be directed underneath the chip. Where such tools are being used in gangs, the tool designer should be held responsible for seeing there is definite provision for this. On single tools, a coolant stream may be directed straight up from below, passing in between the tool and the workpiece. Where this is done, it is well to grind a secondary clearance on the tool in order to provide better coolant access.

In other cases, two coolant streams may be employed, one coming in from each side of the tool and directed



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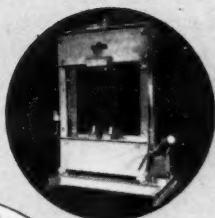
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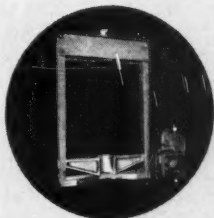
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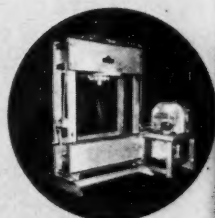
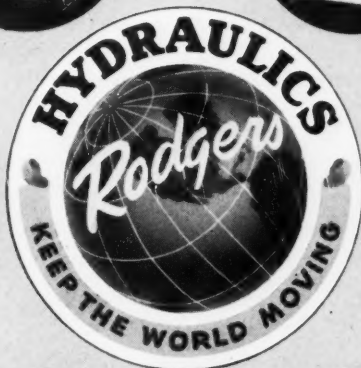
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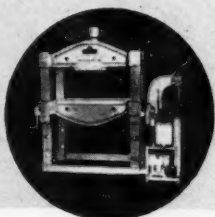
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HYDRAULIC POWER EQUIPMENT

somewhat upward. In cases where it is found expedient, the tool-holding block may be drilled and furnished with a fitting for a coolant-pipe attachment. This can be done in such manner as to provide an unobstructed flow of coolant to the tool nose. This method is particularly worthy of consideration in cases where a number of tools are held in the same block for simultaneous cutting action. As many

coolant passages may be drilled through such a tool block as seems expedient for the particular job at hand.

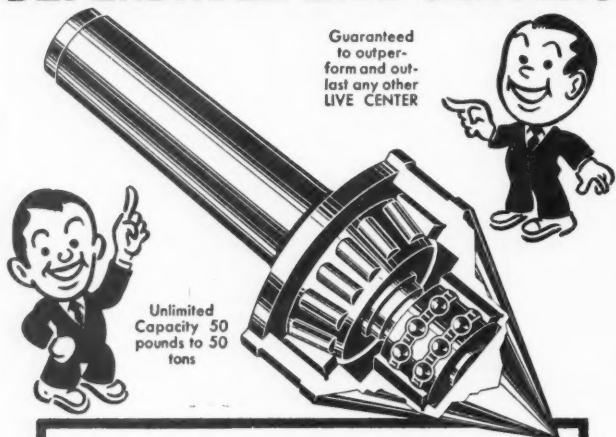
There is sometimes an untoward chemical relationship between a coolant being employed and lubricating oil being used in machine bearings. If you have made a change in coolant, and then discover you are having bearing trouble, it may be found neces-

sary to change to a different lubricant for the bearings. It sometimes occurs that a new coolant contains more acid or more alkali than did the old, and that it tends to break down the bearing lubricant. This is a point worth keeping in mind where coolant changes are made.

Importance of Efficient Pump

The coolant pump employed is very important relative to coolant application. Such a pump must be designed so it will continue to operate efficiently under the abrasive conditions introduced by presence of small steel chips in the fluid. True, a proper filter

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may be employed, but the pump should also be efficient. A pump which operates very efficiently on coolants of heavy body may not be very good for lighter ones. Too, pumps which have worn in some degree will often handle heavy-bodied coolants with perfect efficiency, but they will not readily deliver a full quota of light-bodied material.

Obviously, the pipe or hose through

which coolant is delivered must be in the best of condition. Suitable strainers and filters for use in coolant systems are available from various sources. For use in various places where the tool does not travel, and where there is no chance of chips driving them to one side, flexible coolant spouts are available which are adjustable to any desired position by a touch of the hand. They will stay in place re-

gardless of machine vibration or the volume of coolant flow passing through them, and are readily adaptable to practically any machine tool.

Where tools travel, as on carbide lathe tooling, nozzles of coolant spouts must be locked securely so they will definitely follow the tool, and so chips cannot possibly displace them. One must be sure the coolant valves are open, to deliver a good volume, and also that the pump delivers proper volume. The coolant tank should periodically be given adequate attention so as to be certain that it is suitably full and properly clean.



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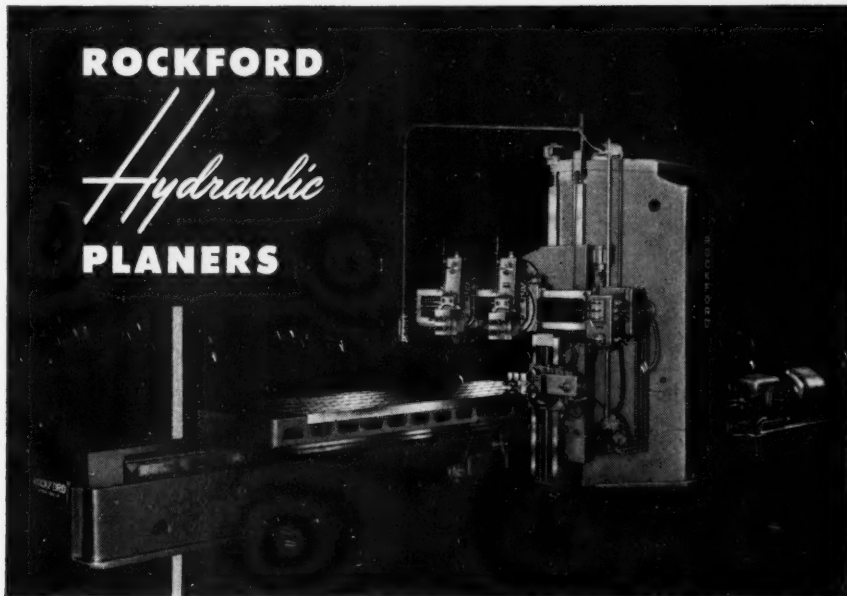
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cross slide, $5\frac{1}{2}$ " over
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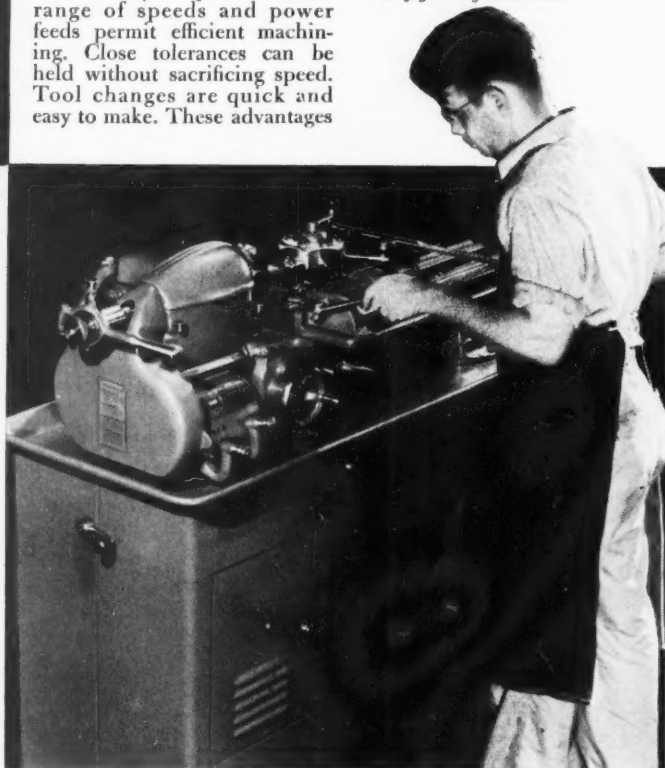
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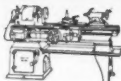
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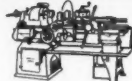
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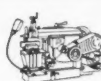
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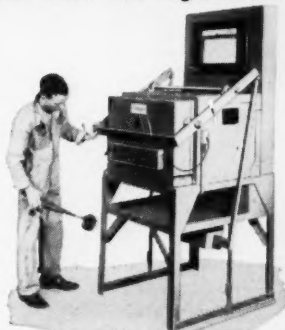
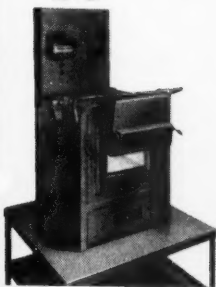
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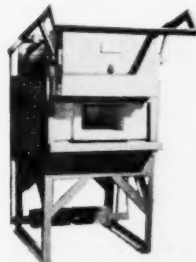
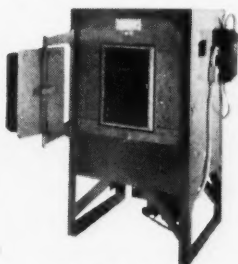
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Safety Devices for Dies and Machines

Fig. 1—The guard device on the press shown here is designed to make a clean sweep across the front of the die each time the ram descends.

In which the author describes the application of several commercially available safety devices.

By C. W. HINMAN
Designing Engineer

A POPULARLY known power press guard is illustrated in Fig. 1. This guard is designed to make a clean sweep across the front of the die when the ram descends, and thereby push away the operator's hand if he has accidentally placed it in a dangerous position under the punch. Another type of safety appliance involves telescopic covers for punch and die guide pins. They are easily attached or detached. Covers are made to protect the die gap only and others to cover the entire pin and gap. These covers make

safety sure when the press tool closes. Another type of guide pin cover carries an inner felt ring to ensure proper lubrication of the pins.

Kick-Press-Guard

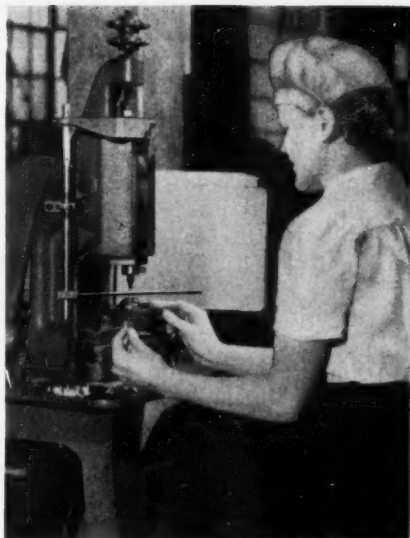
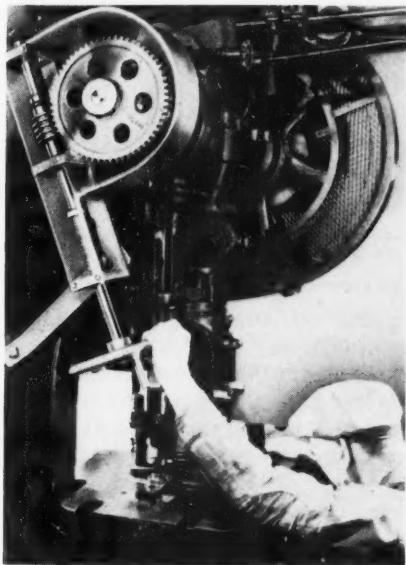
Illustrated in Fig. 2 is a safe-kick-guard which is a companion to sweep-guards that are used on large power presses. It operates by a downward movement of the press ram. In the illustration this guard is shown attached to a vertical shaft on the left side of a kicker-press. The arm sweeps to-

Fig. 2—The guard shown here is of the sweep-type and operates on the downward movement of the press ram.

ward the left and pushes away the operator's hand if accidentally placed under the punch. Sweep guards can be adjusted to various arc movements to suit the die and operation involved. They can also be bent or twisted in various shapes to suit any die operation.

Safety for Die Setters

Press accidents frequently happen to die setters when they are adjusting the press stroke or attempting to set the die correctly. Figure 3 illustrates the "Big Little Inch" for die setters and is sponsored by the All American Safety Equipment Company. This device is designed for lowering the press ram and "inching" it to its proper position.



ition. Use of this equipment saves time and increases morale of the die setter because all hazards are removed, the usual damage to the work and possible damage to the die are eliminated, and it requires less physical effort to handle it.

This equipment has no loose parts. It is provided with a built-in automatic safety release that disengages the gears if the press should accidentally start. It is possible to lower the ram as slow as the operator requires and with micrometric precision. The die is always in the field of vision. An additional advantage is the moderate cost of this "die setter" compared to the expensive damage that may occur by using the old time methods of die

Fig. 3—The device shown in this illustration is designed for "inching" the press ram into proper position.

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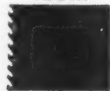
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setting without it. There are two positions of the worm gear: 1. In-mesh as seen in the illustration; 2. Out-of-mesh when the job is ready to run.

Enclosure Guards

A safety enclosure guard, made in many designs and sizes is shown in use in Fig. 4 and is furnished in all types

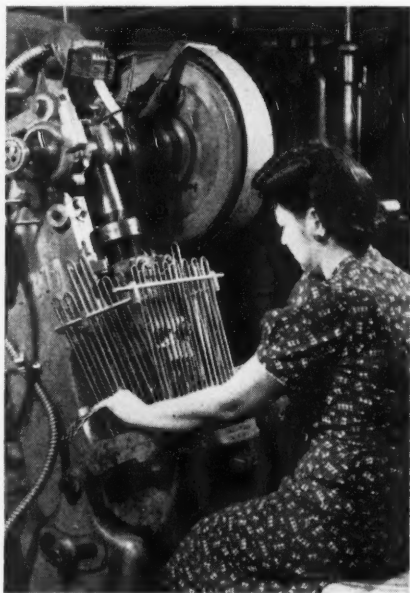


Fig. 4—Shown here is a guard of the enclosure type which can be adjusted to accommodate various types of workpieces.

by the All American Safety Equipment Company. Notice that the looped wires in the fence can be raised or lowered to facilitate introducing work anywhere around the guard. It can be used with safety in blanking, piercing, notching, dial and chute feeds, cut-offs, corners, angles and holding operations. It can be applied to all types of presses and jobs. This guard permits

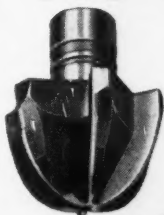
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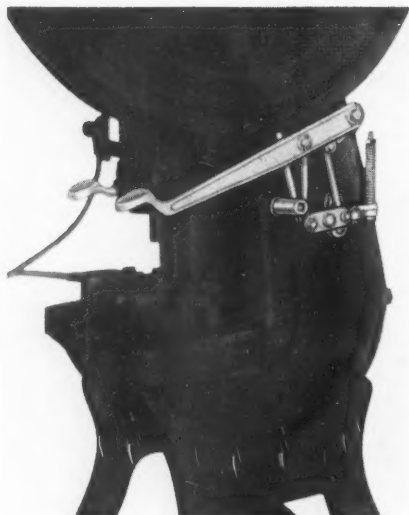


Fig. 5—The safety device shown here provides for safely tripping the ram into action with two hands.

inactive by a careless operator as is the case with some safety guards.

Two Hand Safety

Thousands of presses are equipped for safety tripping the ram into action with both hands, as indicated in Fig. 5. To operate this double hand-lever "trip", both hands must be used. Each hand depresses one lever-arm in unison with the other to engage the clutch. Both hands are away from the danger zone when the die closes and punches descend.

fast work. Since there is no necessity to attempt putting it out of commission to beat the rate, it cannot be made

Non-repeating Safety Device

Figure 6 illustrates the Walsh Power Press Safety device. Two buttons, at

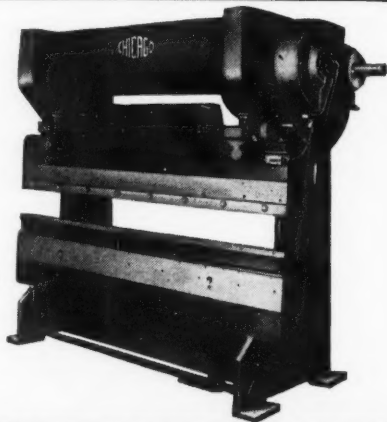


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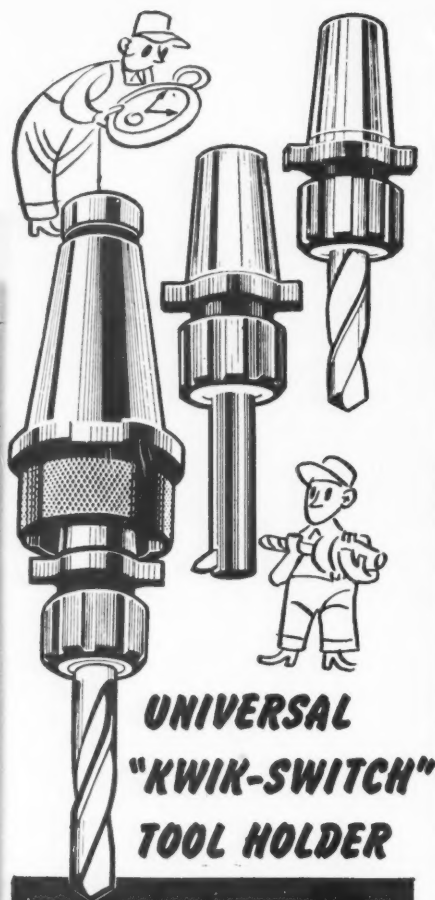
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the front of press, must be pushed in unison to engage the clutch. Both buttons can be locked for continuous blanking or either button locked when forming; this compels the operator to press only one button to start the press. When the die is set, the safety device is also set for the work to be

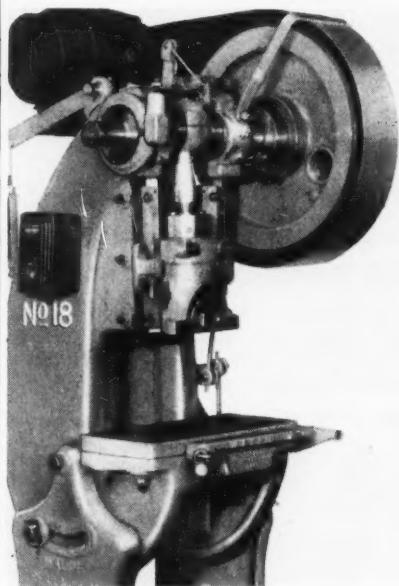


Fig. 6—Press equipped with safety device which can be locked after die is set.

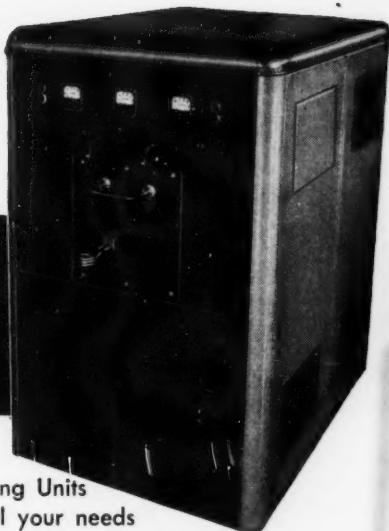
done, and as the device is under lock and key the operator must work in accordance with the setup or get the foreman's consent to make changes.

Safety Tongs

Figure 7 shows a press operator making use of safety tongs to remove a drawn aluminum kitchenware pan from the punch in a compound drawing die. The tongs are made of $\frac{3}{8}$ in. diameter aluminum rod, and if acci-

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Fig. 7 — Illustration showing operator using safety tongs to handle workpieces.

dentally caught in the die, the aluminum is soft enough to prevent fracturing either the dies or press, and the operator escapes injury.

Complete Safety Guard for Presses

The illustration Fig. 8, was made

this plant. When depressing the "triplever" which operates the clutch, the guards automatically withdraw the workman's hands away from the danger zone under the punches. Cables from the ram mechanism pass over

from a photograph which was taken in the Lockheed Aircraft plant at Burbank, California. Safety wrist guards are worn by many punch press operators in

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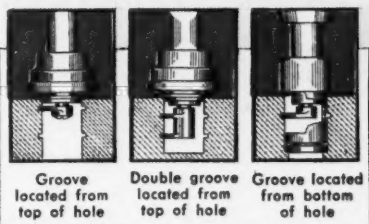
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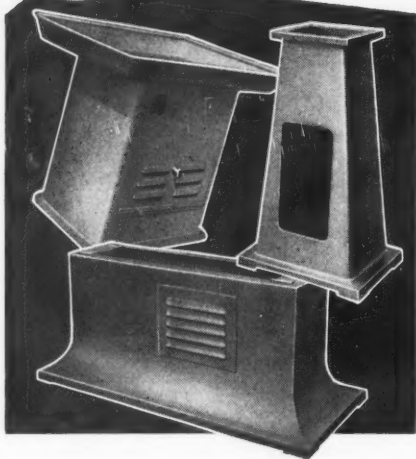
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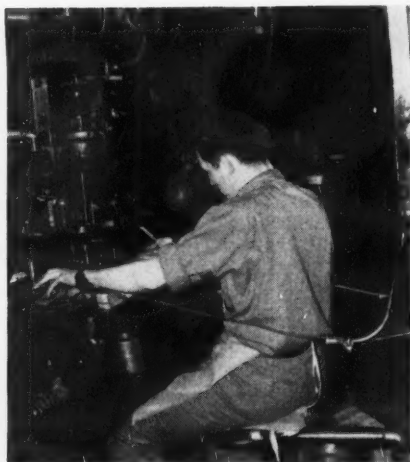


Fig. 8—Press operator shown here is provided with safety wrist guards which automatically withdraw hands from danger zone during operation of the press.

sheave wheels and run down a vertical post fixed in the floor behind the operator, and are attached to the operator's wrists. This equipment can be purchased from the All American Safety Equipment Company, who furnishes a similar one, and can also furnish the wristlets which are of modern design, as shown in Fig. 9.

Fig. 9—Wristlets of modern design for use with the safety mechanism setup shown in Fig. 8.





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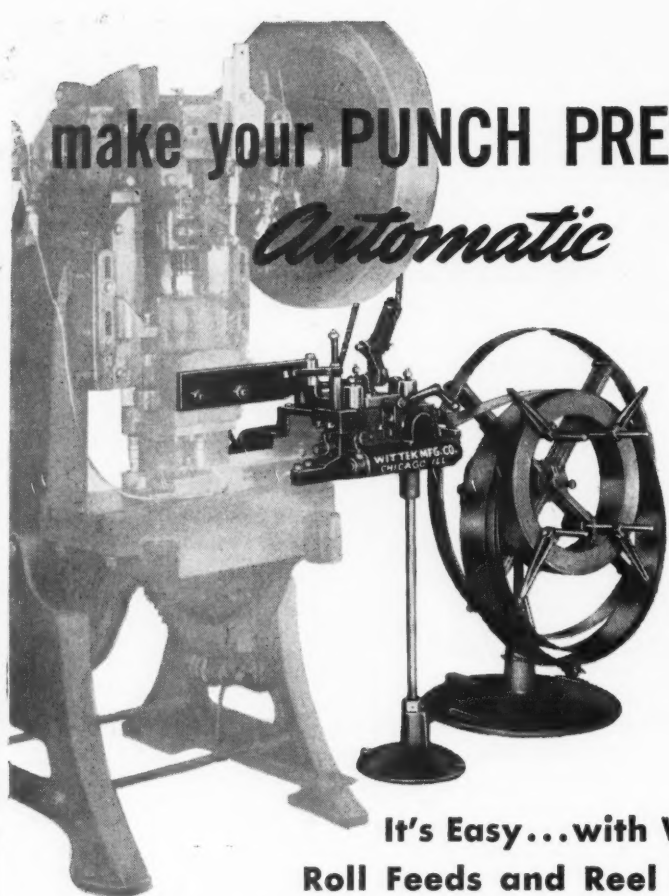
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April, 1952

MODERN MACHINE SHOP 199



So You Want To Save Materials

▲
The history of every rejected part is kept in these files. When the same part begins to be rejected repeatedly, an investigation is started to determine the cause.

A well organized material conservation plan pays dividends at Douglas Aircraft.

By BARTLETT WEST

MANY material conservation engineers will hazard the opinion that out of every four major precision products (such as airplanes) being produced today, one is scrapped. This is an impressive way of saying that approximately twenty-five per cent of all raw material that enters the plant ends up as waste. Such a proportion constitutes a serious economic problem at any time. Today, with our national security hinged on the maintenance of an ample material supply, this waste figure is both critical and dangerous.

What can be done about it? The answer may lie in the various conservation activities now being conducted on a coordinated basis in the several plants of Douglas Aircraft Company. The Douglas Company, due to its vast demands for critical materials and

products of all kinds, has become extremely conservation conscious. It has reorganized and revitalized its conservation program to affect every company activity and department that may, directly or indirectly, cause wasted time, wasted materials, or wasted manpower. These activities include engineering, planning, tooling, plant engineering, manufacturing control, inspection, manufacturing, and the material division itself. Waste may originate in any of these divisions. Purpose of the new conservation program is to ferret out the reason for waste, then attack the problem at its source.

"We are no longer known as a 'material conservation' group," says E. A. D'Amico, supervisor of conservation at the Douglas El Segundo Division. "The word 'material' was too

limiting to explain the scope of our activities. We're now known as the 'Department of Conservation' which is more expressive of our work."

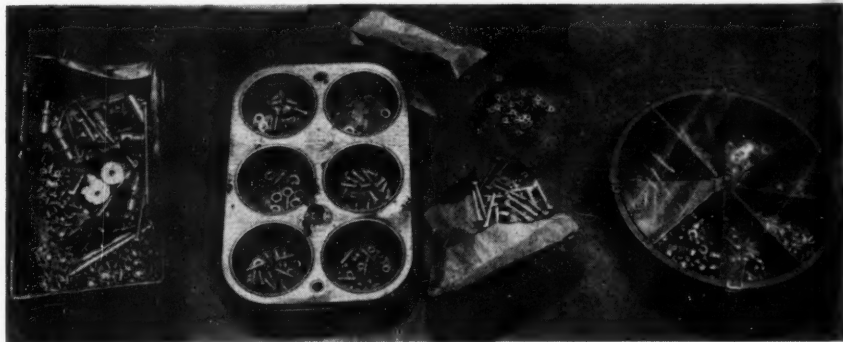
Reorganization of the Douglas conservation activities began at the top. Just recently, Donald W. Douglas, company president, appointed T. E. Springer, vice-president general manager of the El Segundo Division, as permanent chairman of a company-wide Advisory Committee on Conservation. In this capacity, Springer heads a coordinating committee made up of representatives from each plant. As the name implies, the prime purpose of this group is to coordinate conservation policies on a company-wide basis, and to provide a medium for interplant exchange of progressive ideas and productive practices.

The next step in the program called for the General Manager of each plant to form a coordinating committee to coordinate inplant policies and activities. Membership on this committee is illustrative of the extended scope of the current conservation program.

Each plant division is represented, including a member from Engineering, Material, Tooling, Inspection, Planning, Manufacturing Control, Manufacturing, and Plant Engineering. This committee meets monthly and functions not only to coordinate inplant activities, but as an intermediary for the company-wide coordinating committee.

This general set-up, apart and aside from the physical aspects of conservation work, provides a close-knit organization into which all facets of each activity in the several plants, as they pertain to conservation, can be brought together and studied for the benefit of the entire Douglas enterprise.

In appointing Springer to his present post, Donald Douglas said: "The current situation in respect to material shortages and the prospect that this condition will worsen as we move deeper into the defense program make it imperative that we intensify our efforts to conserve materials. This is a problem that concerns all levels of management." Douglas pointed out



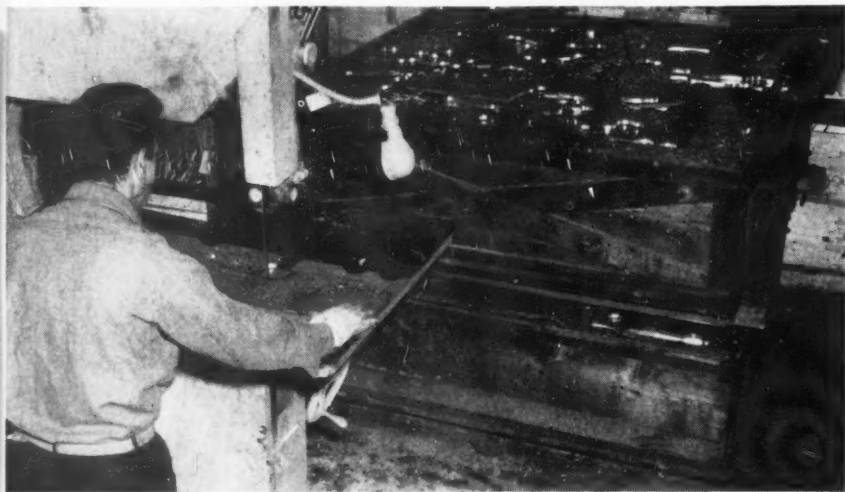
Four types of small parts containers, one of which is most efficient. Excessive time is wasted while selecting the correct small parts from the mixture shown in pan at far left. The "muffin" pan permits parts to be mixed indiscriminately. Sacks become torn and small parts scattered. The pan at far right is provided with a plastic cover with an opening just large enough to admit the hand to one department. Mixing of parts is eliminated, and the danger of spillage is reduced to a minimum.

that the objective of the company's continuing material conservation program is to reduce and maintain the level of unusable material and work to within 2.5 per cent of parts produced.

The inplant conservation activities at Douglas are divided into two distinct phases — (1) the statistical section; and (2) the plant section, or physical

ment. Lists of rejected parts are made up daily, with repeat items noted in red. These lists are then circulated to all departmental supervisors who may act accordingly on the emphasized rejections.

This emphasizing in red if items repeated rejected has led to some interesting discoveries regarding why



Reclaiming plate scrap in the tooling department. The scrap is re-dimensioned in smaller sizes and used for smaller tool components.

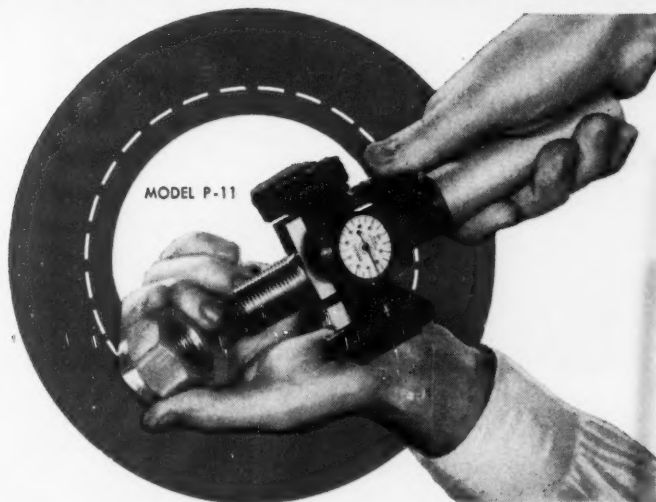
operations. Both groups have the same goal — to obtain maximum effective use of materials, manpower and time. How this objective is achieved depends upon the nature of the waste occurring, where it occurs, and the responsibility for its occurrence.

The statistical section of the conservation group plays an important role in the current setup, and provides vital information for the physical work necessary to eliminate waste at its source. One duty of this section is to keep a running history of every part received by the Conservation Depart-

parts are rejected. In one case a formed aluminum panel continued to crack during forming and had to be rejected. An investigation was started to determine the cause. Manufacturing techniques and workmanship were found to be adequate. Tooling was not to blame. The part had been engineered and designed well with the known formability limits of the material in use.

It was then noted that all cracked parts occurred when aluminum sheet from one particular aluminum company was used. Parts formed from

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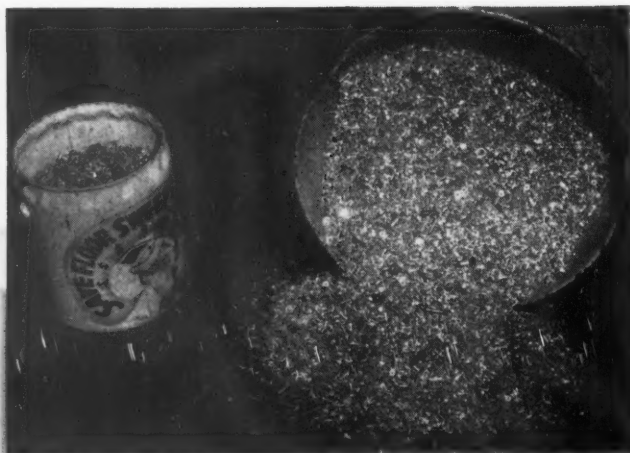
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Floor sweepings such as this are sorted for the many valuable small parts they contain. Washers, nuts, bolts, rivets, and so on, are reclaimed in volume.

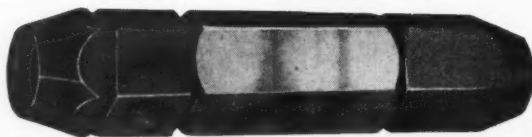
sheet obtained from other companies did not crack. Further investigation revealed that the aluminum sheet that cracked was on the high side of AN Specification alloy requirements, while the sheet that did not crack was on the low side of alloy requirements. This slight difference of alloy constituents, well within specification requirements, introduced a metallurgical factor that caused that particular part to crack in forming. In the days when material conservation consisted mainly of salvage work and scrap gathering, such an inconspicuous fault would not have been traced, and defective parts would have continued to occur.

Investigate whether or not their particular department may be responsible. Engineering beyond the design limits of the material, design of parts that are extremely difficult to fabricate, and poor, inadequate, or defective tooling, can cause rejects and waste just as readily as poor or careless workmanship.

Other information provided by the statistical group includes data on the total number of parts submitted to Inspection, the parts acceptable "as is," parts not acceptable, number of parts reworked, and number of parts ultimately scrapped. This information is used to prepare weekly bar charts

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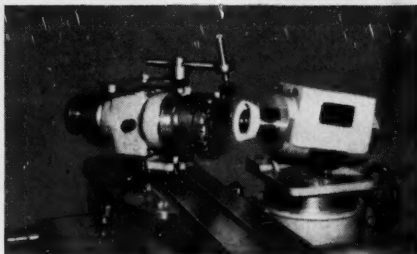
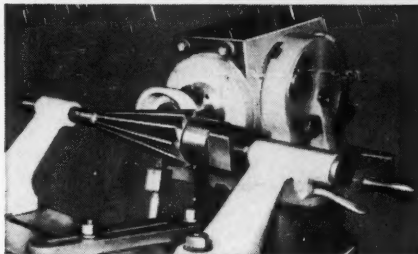
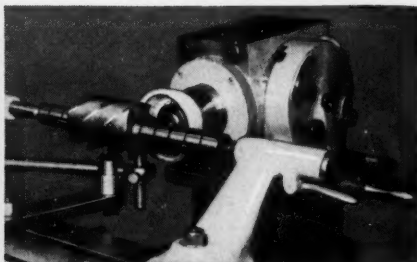
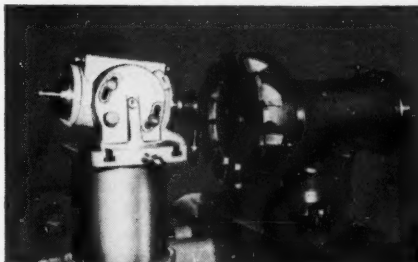
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which reflect the percentage and dollar value of rejected material. Copies of these bar charts go to the General Manager, and are exchanged between plants. These charts and other data are consolidated into a monthly report for use by the company-wide coordinating committee. Thus trends can be noted, advantages revealed, and practices that eliminate waste in one plant can be duplicated by the conservation departments in the other plants.

The work of the physical operations section of the conservation depart-

ment is divided three ways—(1) efficient collection, segregation and sale of scrap material; (2) the reclamation, where possible, of scrapped or obsolete parts; and (3) tracing waste

to its source, and eliminating the cause whenever possible. Efficient collection, segregation and sale of scrap material has always been a function of material conservation groups, and the methods employed are quite conventional. The main objective of this activity is to obtain the maximum dollar value from material that is hopelessly wasted insofar as production is concerned. At Douglas, this waste is carefully analyzed as to value, and disposal made accordingly. Old blueprints are not sold for waste paper,

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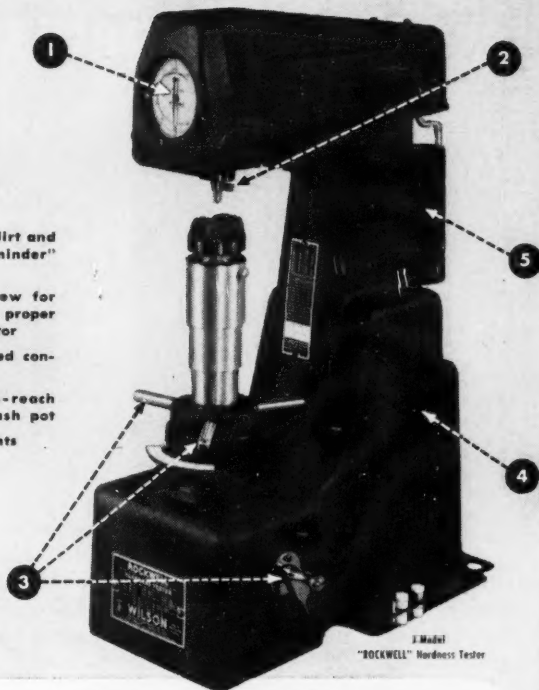
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The reclamation of scrapped or obsolete material and parts is fertile ground for much conservation and salvage work. When an assembly becomes obsolete, it does not necessarily mean that all its component parts are obsolete. At Douglas, when such obsolete assemblies reach the conservation department, all component parts that are still usable are removed and returned to the production line. This

but are shredded and used for packing. Floor sweepings are not carted away and dumped but are sorted for numerous small items of value, such as rivets, screws, nuts, bolts, cotter pins, and so on, which they contain. Dirty gloves are not consigned to the incinerator, but are cleaned and re-issued. The net value of this carefully thought out salvage work reaches a large sum yearly, and if practiced on

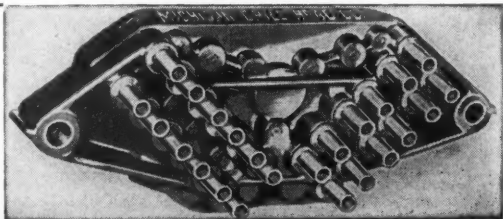
might include pulleys, plumbing, wiring, and so on. Occasionally these obsolete assemblies will furnish material for the company's employee training program, such as sheet metal for practice riveting, drilling, forming and so on.

Reclamation of used shop tools is another activity that has proved profitable. Clogged files are cleaned and re-issued; tipped cutting tools are re-

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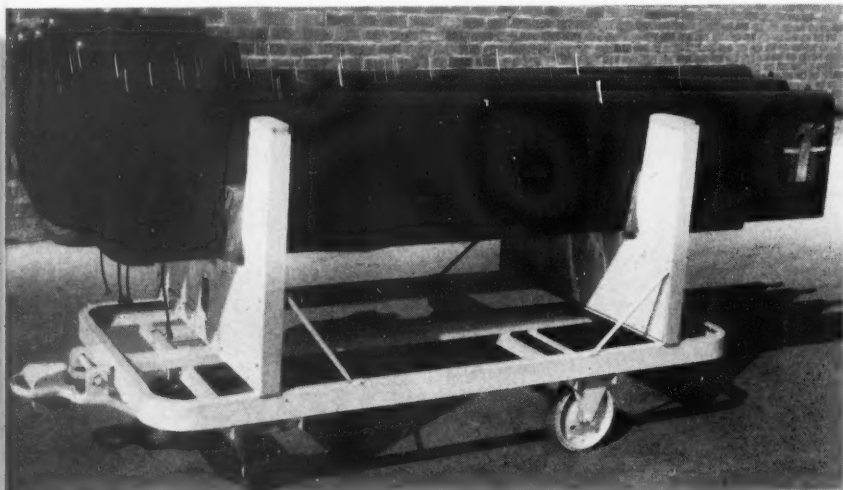
April, 1952

MODERN MACHINE SHOP 209

tipped and re-used. In the tool production department itself, larger sizes of router scrap are re-dimensioned and used for producing small tool components.

Tracing waste to its source and eliminating the cause when possible are relatively new functions of conserva-

tion. Poor planning may be poor or overly critical. Poor planning can result in much wasted time and the loss of many man hours, and poor methods of material handling can result in many rejected parts. Plant engineering is responsible for furnishing adequate working facilities, while the plant transportation



Efficient material handling can aid in material conservation by reducing injured parts during handling. Here four airplane control surfaces are being transported in special cradles designed to hold them firmly and prevent bumping and denting.

tion work, and offer by far the largest opportunities for improvement. This facet of conservation work is heavily stressed in the current Douglas program. The fact that waste is occurring is sufficient evidence to start an investigation, and these investigations are not restricted regardless of whom or what department they may affect.

In a few cases, a change of major policies may be necessary to eliminate the waste; in other cases engineering, design, or tooling may be to blame. Shop supervision may be lax, allowing slipshod workmanship to occur, or in-

department must provide its quota of service with a minimum of lost time and often on rigid schedule.

These are only a few of the more obvious departments where wasted material, wasted man hours, and wasted time may occur. Working on the theory that the best way to reduce waste is to eliminate its cause, the Douglas Conservation Department investigators are not limited in their probing, and have direct channels to higher authority to obtain the desired action. But direct action is not always necessary. Psychology and suggestion



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will often suffice where direct action might fail.

"The conservation of burden items, such as pencils, paper, flashlight batteries, and so on, is a difficult task," E. A. D'Amico admits. "Here we encounter a psychological problem that direct action can do little about. We must attack these problems indirectly, then study the results to see if we are obtaining the hoped for achievement.

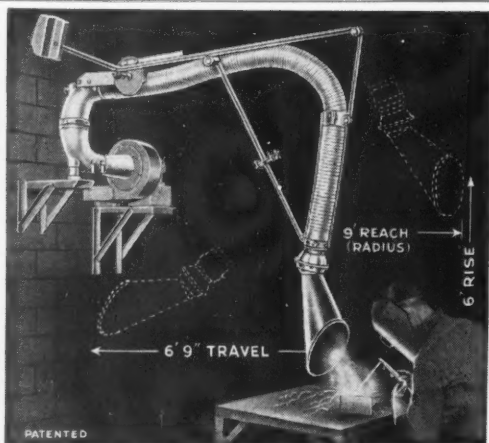
"The results we obtained in the

conservation of ordinary lead pencils is a good illustration. We started in one department at first, requiring the return of a pencil stub for each new pencil issued. Pencils used in that department dropped 50 per cent."

D'Amico points out that another psychological problem involves employee stockroom trips. The average employee will draw out more small items—nuts, bolts, washers, and so on—than he will need just to prevent the

possibility of making another stockroom trip. Now these small items are stocked in cabinets or bins directly in the department. A noticeable saving has accrued. When an employee's flashlight batteries grow weak, he will invariably turn in all the battery cells and ask for new. In many cases, all but one of the dry cells are still in good condition.

Another attack using the psychological angle of material conservation has been made through employee training. Posters throughout the plant emphasize the value and importance of con-



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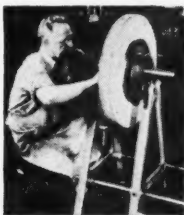
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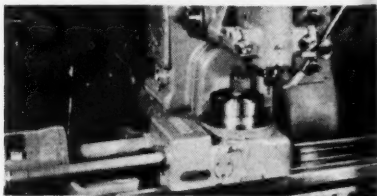
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Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means

for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

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This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

In many cases, the addition of this Automatic index base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this.

Free Data

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servation. The slogan used on these posters is the result of a company-wide contest with suitable prizes. The winning slogan was . . . "WASTE REDUCED . . . MORE PRODUCED." This slogan contest made a large number of employees personally aware of poster significance even before they appeared.

Some major production changes have taken place in the various Doug-

las plants due primarily to data uncovered by the Conservation Department investigators. At one time, scrap material from the punch press departments amounted to huge proportions. Standard size sheet stock was used from which the parts were blanked. It was left to the punch press operator's discretion to use a punch pattern that would minimize waste. Ofttimes this discretion was sadly wanting in results.

Today, whenever applicable, strip stock in graduated widths is used in the punch press departments at the El Segundo Division of Douglas. All punch press dies are coded so that they will be used with strip stock of a designated width. Die size and strip width are carefully pre-matched by the planning department to obtain the greatest number of blanks with the least possible waste. The amount of scrap now accruing in the punch press departments has been materially reduced.

"Conservation activity in our plant is



AIM TO PLEASE

To say we aim to please is just another way of saying we give you the kind of service you like.

We recognize that gear *quality* is essential—and we maintain that quality—but we also know there's no substitute for good *service* either. We like to feel that it's that little extra of *both* that not only keeps bringing in new customers, but keeps bringing old customers back. **THE EARLE GEAR & MACHINE CO., 4707 Stenton Ave., Philadelphia 44, Pa.**

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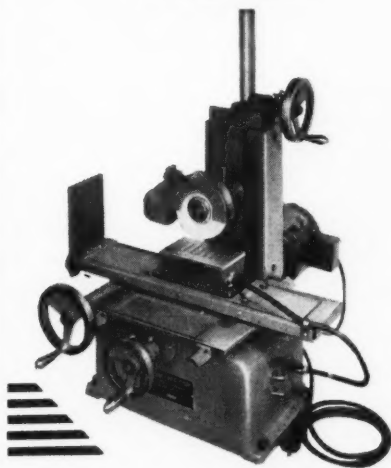
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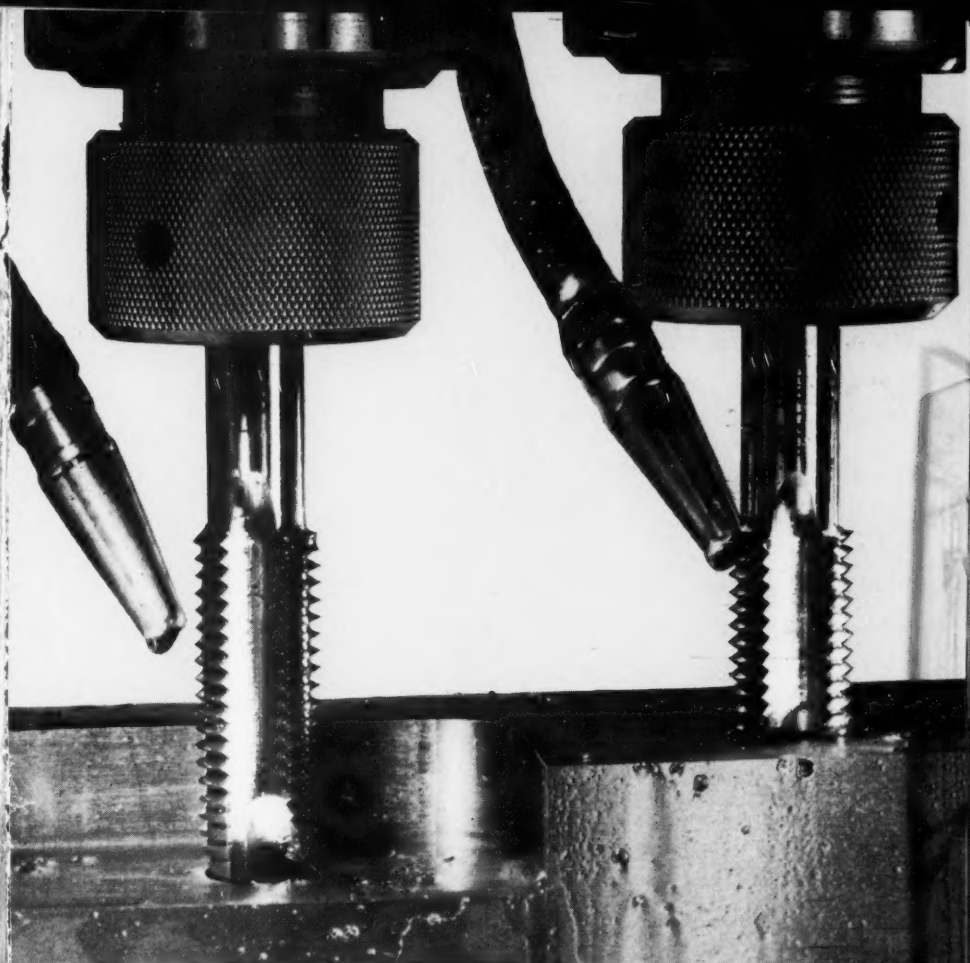
rapidly approaching a team-work basis," D'Amico points out. "In most cases, cooperation is voluntary. We do not employ a large corps of conservation engineers. A few interested and competent people can do the job nicely."

In overall perspective, the Douglas Company Conservation Departments have been elevated from the mere duties of scrap collecting to the more profound duties of preventing scrap and waste from occurring. They are provided with direct channels through which management can be influenced to obtain the desired results. In this new guise, they rate in importance with other departments more directly concerned with engineering and production. Only by the attainment of such a status can progressive and efficient conservation work be accomplished.

"It is true that we have our ultimate departmental goals to work toward," D'Amico says, "but in final analysis, our goals parallel and supplement a goal that now inspires the entire Douglas organization. This goal, in the light of the current national emergency, is to produce a better and less costly airplane, and use a minimum of material and time in doing so. This, we think, will constitute a maximum contribution to our national security."

All illustrations in this article courtesy
El Segundo Division of Douglas
Aircraft Company.

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THE "GUN" TAP, the original spiral pointed tap, was developed by GREENFIELD to lick tap enemy No. 1, breakage due to chips clogging in the flutes. This problem is especially troublesome in "stringy" metals where the chip is long and curling.

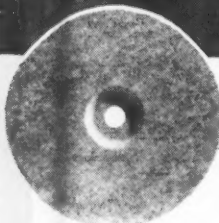
The Gun point solves the problem in through holes by causing the chips to shear and "shoot" out ahead of the tap.

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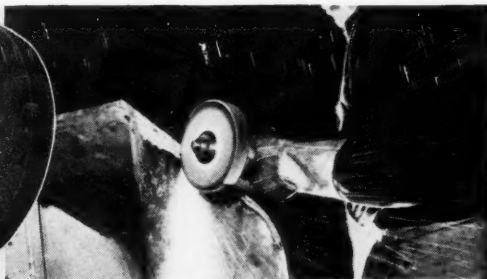
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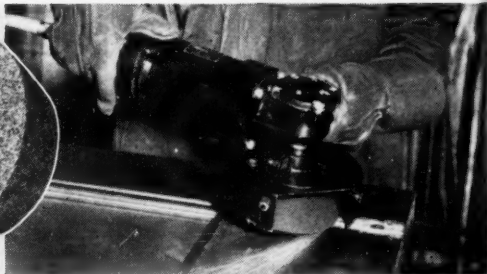
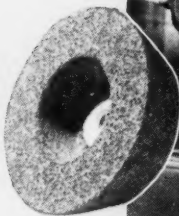
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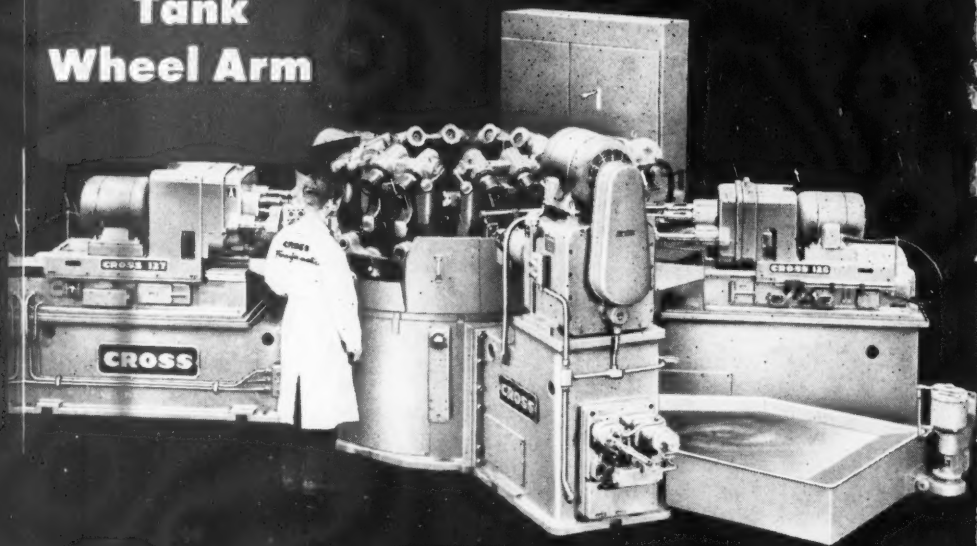


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ELEVATING TABLE EXTENDED



LOW POSITION

When Turnover Becomes a Problem

In which the author briefly analyzes five situations that usually exist wherever employee turnover has developed into a serious problem

By ALFRED M. COOPER
Author, "How to Supervise People"

ACCORDING to recent press dispatches, workers in many large industrial centers are indulging in an orgy of job-changing. As employment reaches an all-time high, both in defense industries and in consumer goods manufacture and service, one worker

—which in any period of full employment affects about equally all industrial areas of the country—hints darkly that unless this wave of job-quitting subsides it may become necessary to "freeze workers to their jobs."

Cutting down labor turnover is perhaps the oldest problem in personnel management, and when jobs are plentiful the rate of turnover has a way of getting out of hand. When the situation becomes so bad as to cause concern in the front office, a "fact-finding" committee may be organized to discover what is behind this sudden outbreak of job-changing within a given industry or throughout a particular region.

So long as we have a democracy in this country we will always have a restless minority who will change jobs on slight provocation whenever a new job is waiting around the corner. On the other hand, it is ridiculous to talk about freezing workers in their jobs—certainly in any situation short of all-out war.

Whenever 5 per cent of the employees of any organization change jobs in a single month there is probably something seriously wrong with the personnel policies of that plant. Freez-

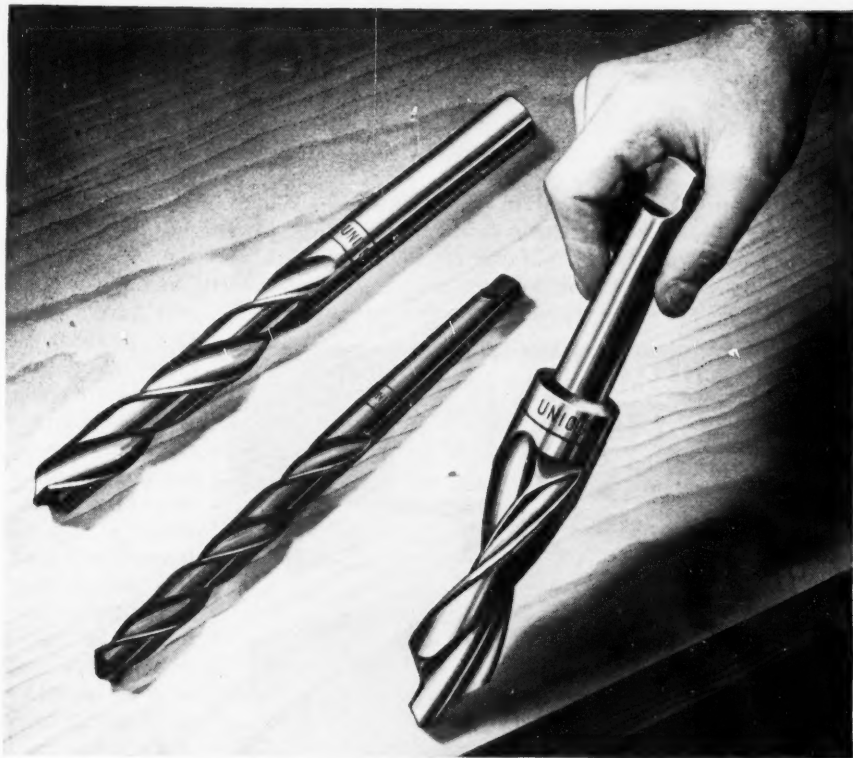


...SOMETHING SERIOUSLY WRONG
WITH PERSONNEL PROBLEMS

in 20, in some industrial areas, now quits his job every month. That puts turnover at 5 per cent, and the replacement cost of each employee on the average is \$80.

Editorial comment on this situation

Illustrations by Don Ritchie.



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ing a dissatisfied worker to a job he dislikes not only tends to lower employee morale yet further, but substitutes force for an intelligent solution to the turnover problem. Threats of "freezing" have a similar depressing effect on morale.

Over a period of years I have conducted discussions of this costly turnover problem with many thousands of factory supervisors and employees. As

a result I have come to the conclusion that the reasons for turnover exist in many organizations all of the time, only awaiting a period of full employment to bring on a veritable wave of job-changing. If we are going to cut down turnover, we must make an effort to ascertain and eliminate these reasons before job-quitting reaches epidemic proportions.

Personnel officers and supervisors

who have studied this problem. at close range for years are emphatic in stating that wholesale job-quitting is not a matter of impulse, but is an indication that the worker may be taking the only method he knows to protest against what he considers to be unfair personnel practices in effect in that plant. It would appear that the simplest solution in any instance would be not to freeze a man or woman to a distasteful job, but rather to scrutinize the entire structure of personnel policy and clean house regarding any rules or practices that create ill-will among the work-



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ers without accomplishing anything worth while.

It has been my experience that cleaning out the deadwood in personnel and administrative regulations shortly results in a sharp decrease in labor turnover with a corresponding improvement in employee morale. In general, one or more of the following situations may be found to exist in any plant

where labor turnover has developed into a serious problem.

Worker Dissatisfaction

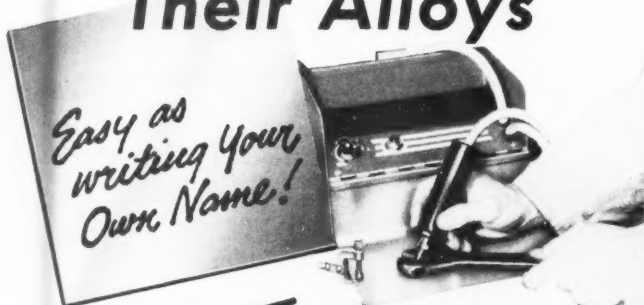
Until jobs become plentiful, workers may put up with oppressive personnel practices and improper supervisory technique and never register a complaint. Then, when the labor market tightens up, employees quietly turn in

their time and set about finding a better place in which to spend their working hours.

Because worker dissatisfaction is likely to be concealed in time of labor surplusage, management may receive quite a shock when jobs become really plentiful again. The worker's natural assumption is that management must know what the foremen and minor executives are doing, and must approve of the supervisory practices.

Whenever surveys have been made to ascertain the worker's attitude toward his job and his company, almost invariably the serious complaints

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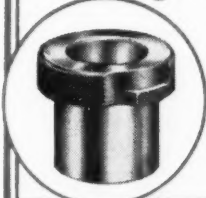


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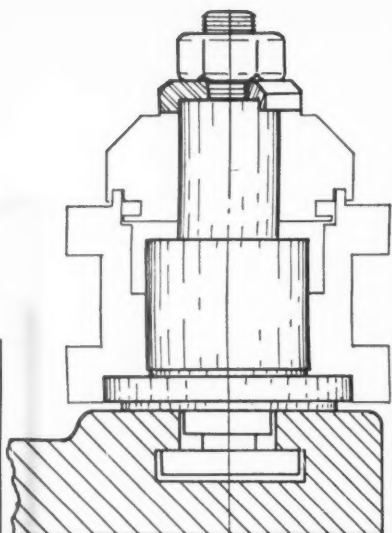
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concern no fundamental matters pertaining to company policy, working conditions, or wages. Rather, the workman registers the deepest resentment regarding oppressive tactics employed by some petty martinet of an immediate supervisor concerning whose actions in this respect management may have no knowledge whatever.

Nevertheless, to the worker this immediate supervisor is management. When jobs are scarce the work force will put up with a lot of unfair supervisory practices and only discuss these matters within its own ranks. When jobs become plentiful the workers quietly detach themselves from the payroll and apply for jobs in plants in which, according to the grapevine, the relationship between workman and foreman is on a fair, man-to-man basis.



More often than not, even when making this change the worker will not discuss his real reason for leaving the employ of the plant in which he was dissatisfied, but gives some altogether specious excuse which leaves the record clear in case he should later find it necessary to apply once more for his old job. Thus, a study of personnel records may continue to leave management in the dark regarding the real reason for the employee's change of jobs.

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In conducting foremanship training in more than a score of plants I have found that most foremen and office supervisors are well aware of what constitutes good supervisory practice. Conversely, they can readily list out the "crimes of supervision" and arrange these horrendous practices in an "order of importance" in terms of the damage they can do to the morale of any working force.

Most supervisory groups rate "partiality" as the chief troublemaker in supervision. Anyone who has ever reported to a supervisor who plays favorites among his subordinates will agree that nothing can create more concealed dissatisfaction in an organization than making concessions to a few "teacher's pets." This fact is so well known that it has always surprised me that management does not

at once become aware of supervisory partiality whenever and wherever it exists, and take steps to stamp it out.

Supervisor Irresponsibility

In addition to a flagrant display of favoritism, management ordinarily can easily and readily check the supervisory force for such other crimes of supervision as breaking promises to subordinates, passing the buck to brother supervisors and subordinates, and failure to cooperate with subordinates, with management, and with fellow supervisors. In some instances it will be found that the



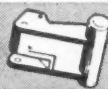
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supervisor is wholly unaware of the degree of dissatisfaction his unfair actions have brought about. In other cases it is obvious that he is well aware of what he is doing but is wholly unconcerned regarding the costly consequences of his tactics.

A supervisor may have his shortcomings brought home to him indirectly through indulging in conference discussion, when no names are mentioned in connection with the presumably hypothetical cases studied. Or, it may become necessary to talk privately with a supervisor and call his attention to specific instances in which he has failed as a supervisor.



CLEAN CUT DETACHMENT
FROM THE PAYROLL

This is about as far as management can go in attempting to rectify the errors of any individual supervisor. Once it becomes evident that this foreman or office manager is going to persist in practices that he knows are creating employee ill-will, nothing is gained by threatening. Simply, there must be some changes made. Most executives and supervisors agree that demotion of such a supervisor does little to remedy the situation. Clean-cut detachment from the payroll appears to be the only effective solution in this instance. A demoted supervisor, when returned to the ranks is likely to become a troublemaker.

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broaching of multiple parts

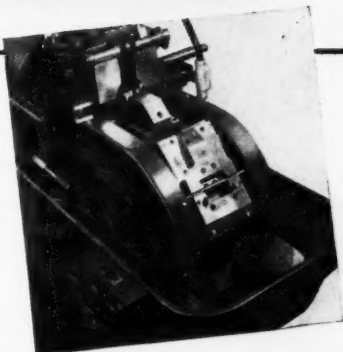
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Accident Prevention

Workers in hazardous occupations are extremely interested in the extent to which management exerts itself to prevent accidents. These workers are concerned in the success of any accident-prevention program that may be in effect, in terms of its ability to reduce sharply the frequency and severity rates of injuries to employees.

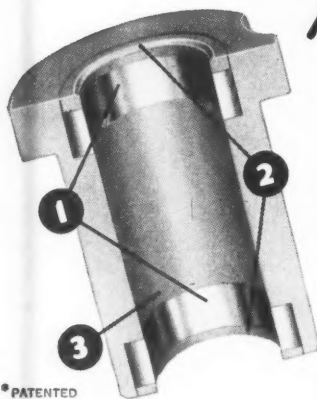
This is an altogether understandable state of mind on the part of the worker. Too often a safety program may take the form of an academic gesture. Certain safety regulations are drawn up, precautionary posters are tacked on the bulletin board, and from time to time somebody exhorts the employees to "be more careful." Machine guards are placed on hazardous equipment. The entire procedure is called a safety

program and may well result in an increase in injuries and fatalities in that department.

Many of the accident - prevention programs which have been instituted in some plants look well on paper but simply do not get results in practice. That was why we killed and injured more people in our factories during World War II than were killed and wounded in all branches of our armed services in the same period.

Workers want safe working conditions and are quick to note ascending injury and death rates in

**MORE HOLES—
MORE ACCURACY—
FASTER—
AT LESS COST**



*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 16.



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HOW? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

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waiting for
and cost of
jigs and fixtures!

Puts work
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Quickly...
Accurately...
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SPEEDI-SPACER saves the cost of . . . and waiting for . . . jigs, fixtures, gauges, dies and templates. It also eliminates storage, obsolescence and maintenance on these costly production accessories. Best of all, SPEEDI-SPACER costs far less than comparable units. With it, any good upright or radial drill or vertical milling machine becomes an accurate jig

boring tool; highly skilled labor is unnecessary.

Easily transferred from machine to machine, the SPEEDI-SPACER can be set-up in a fraction of the time required for setting a jig borer or boring mill. Nine longitudinal and nine transverse stop screws provide precise positioning, maintained by positive locks.

Longitudinal travel is 15"; transverse, 10"; with nine stops in each direction. Overall dimensions are 28" by 22". Mounting T-slots are provided. Find out how much the SPEEDI-SPACER can save in your shop.

Write today for literature.

**QUEEN CITY
MACHINE TOOL CO.**

Queen City Machine Tool Co.
233 East Second St., Cincinnati 2, Ohio

their own departments. When management persists in maintaining an old-fashioned safety program, workers put



up with the situation only until they see a good chance to change to a safer job in another plant.

Accident prevention is primarily a training job, and this training does not

get results if it takes the form of exhortations to "be more careful." I have found that the best form of safety training consists of permitting the employees to devise safe working practices through discussion of the hazards peculiar to their own jobs.

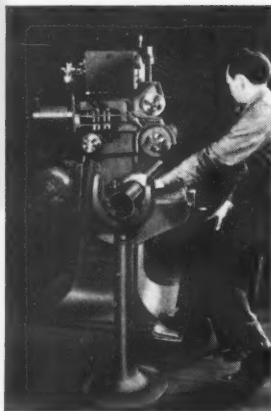
But whatever method is used to reduce accidents it must really get results and the employees must be made aware of the progress that is being made. If progress is **not** being made, the program should be scrapped.

Open Discussion

When management is satisfied that the quality of supervision is no longer a basic cause for executive turnover, it is well for each member of the supervisory force to conduct occasional group discussions with his own subordinates.

These discussions should not be per-

STEEN PIPE AND TUBE CUT-OFF MACHINES



For faster cutting

If you cut pipes and tubes . . . in small or large quantities . . . you can cut faster—easier—with a Steen Cut-Off Machine. Available in hand and automatic air-operated models for pipes and tubes up to 12" diam. Also, Manufacturers of Cut-Off Wheels . . . Chaser and Wheel Grinders. Request Circulars Today.

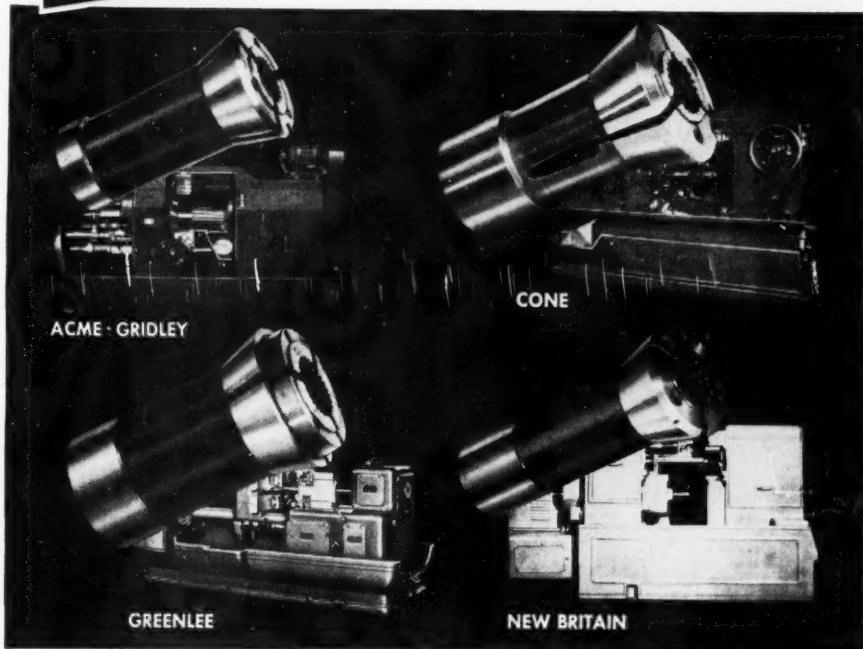
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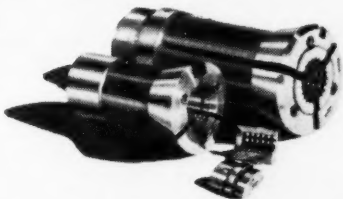


Equip your multiple spindle automatics with HARDINGE Master Collets and Pads—for solid collet performance at low cost.

Available for the following machines up to and including 3 1/2" capacity: Cone; Greenlee; Gridley and Acme-Gridley; National Acme and New Britain.

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- o Final tightening possible for pads when closed on bar stock.
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Hardinge Style "S" Sure Grip
Master Collets and Pads



Write for Style "S" Bulletin—contains complete descriptions, specifications, and ordering information.

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Less TOOL HANDLING

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Here's speedy, light-weight power for weld grinding and finishing work, wire brushing, disc sanding, polishing and many other useful applications. Save operator's time and energy with a MALL Flexible Shaft Machine. Ruggedly built — equipped with heavier-duty, constant speed motor with the power reserve to handle overloads. Shaft and housing made from finest special steels—entire machine quality-built.

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mitted to take the form of fruitless reiteration of grievances, real or imaginary. Neither should they consist of painful wranglings regarding methods or routines—matters that are altogether responsibilities of the supervisor.

Instead, at these conferences the employees are asked for suggestions for improvement of working conditions,

BETTER EMPLOYER AND EMPLOYEE RELATIONS

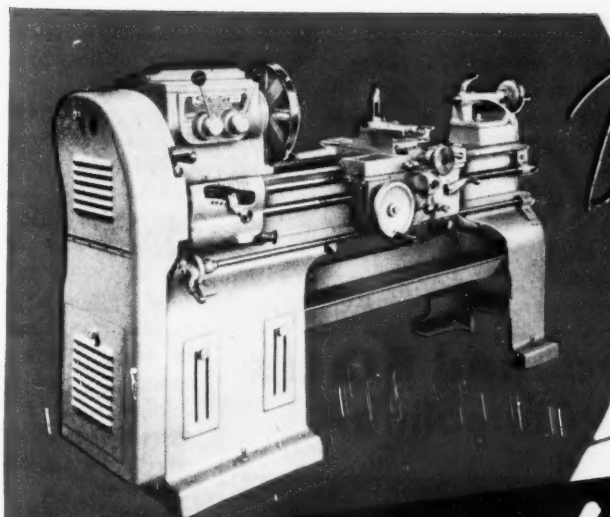


SUGGESTIONS
FOR IMPROVEMENT OF WORKING CONDITIONS

relations between employees, and relations between employer and the employee.

As will be noted, these conferences largely replace the suggestion box as to function. Practiced, they go far beyond the suggestion box in getting the result we are now discussing, which is sharp diminution of employee turnover. Of course the discussions at these conferences also get results in many fields other than continuity of employment.

The weakness of the suggestion box



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precision
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**FINER LATHE CONSTRUCTION • GREATER EASE
OF OPERATION • LONGER, ECONOMICAL SERVICE**

Before you buy a general purpose lathe, investigate the medium-priced Sebastian Lathe. It has all the big-lathe features which contribute to consistent accuracy plus time-saving, labor-saving ease of operation.

Precision . . . built-in to last . . . is assured by: Pre-loaded roller bearing supported spindle, bearings on all headstock shafts, oversized heat-treated headstock gears, .0005" accuracy at every alignment point, taper gibs throughout.

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6 to 8 WEEKS
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RATING
REQUIRED**

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Cincinnati Metalcrafts, Inc.
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lies in the fact that ideas thus submitted are the work of but one brain. A secondary criticism, from the viewpoint of improving management-worker relationships, may be that only relatively few employees benefit substantially by these suggestions.

If the suggestion conference is properly conducted, any ideas brought out are seriously considered by the group, added to or otherwise modified

through discussion, and finally approved by at least a majority of those present.

Conferences of this type may be developed into powerful morale-builders. Their full effect will be felt after it becomes generally known among the employees that their group consensus has been approved and put into effect by management.

In addition, employee welfare programs often stand in need of overhauling. There is urgent need for increased profit-sharing and an extension of something similar to the McCormick Plan, so that all employees of a plant may share in some degree in the establishment of policy relating to matters pertaining to employee welfare.

Management Responsibility

Labor turnover at its best is usually a worrisome affair, but the problem cannot be satisfactorily solved by means of legislation or anything bordering on coercion. Excessive turnover occurs when and where

Drill Hardened Steels without Annealing -



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

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For cutting time while cutting metal,
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Tell your supplier you want STAR—the blades most people buy.

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Makers of Hand and Power Hack Saw Blades,
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⊕ 1082A

April, 1952

MODERN MACHINE SHOP 241

employees are dissatisfied, and usually with cause. Obviously, then, the solution is that of searching out the under-



SEARCHING OUT THE UNDERLYING CAUSES AND REMOVING THEM!

lying causes of dissatisfaction in each plant and department and removing these as promptly as possible. I have found that management consistently

favors this policy, but in many cases has been acting on faulty information obtained from agencies not within its employ. Matters such as improper supervision, increased accident rates, low worker morals, or other correctable sources of friction, are management's business.

Thus, when turnover reaches 5 per cent per month and management is informed that the workers are "just restless," it may be assumed that certain facts behind this costly wave of job-changing have not been made known to management.

In general, a careful scrutiny of the quality of direct supervision the workers are receiving day-by-day, accompanied by a detailed study of those other causes behind excessive turnover, will shortly prove to management that the workers are not inclined

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WITH 2" x 2" MEASURING RANGE

Priced within the range of any small shop.

\$840.00 complete with simple Protractor Ocular.

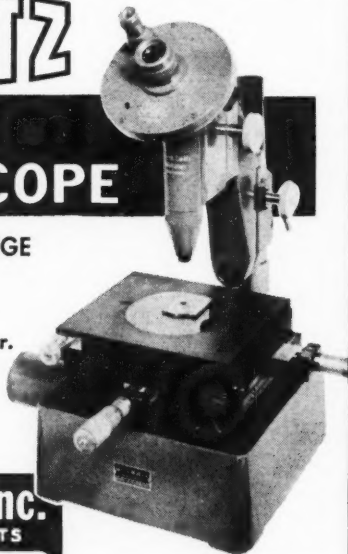
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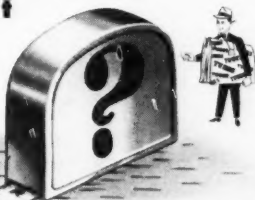
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at



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Here are the different kinds of length you can specify for all B&W Mechanical Tubing. Remember, as you go *down* the following list, the *price* generally goes down.

CUT LENGTH: close plus tolerance on a specified length; base price on lengths 10-24 feet . . . cut-lengths over 24' and under 10' cost more.

MULTIPLE LENGTH: suitable for cutting into smaller pieces of a specified length with negligible loss; up to 3 1/2% saving in price.

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RANDOM LENGTH: no specified minimum or maximum; 5% saving in price.

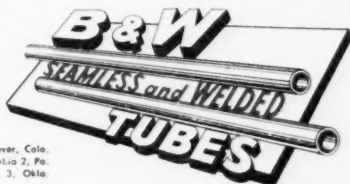
Consider your product, production set-up, material handling, and stores facilities. Then fit your length-specification to the job, for initial savings and optimum scrap loss. New Bulletin TB-335 gives details on length and other descriptive terms, a clear understanding of which will simplify and facilitate ordering.

THE BABCOCK & WILCOX COMPANY TUBULAR PRODUCTS DIVISION

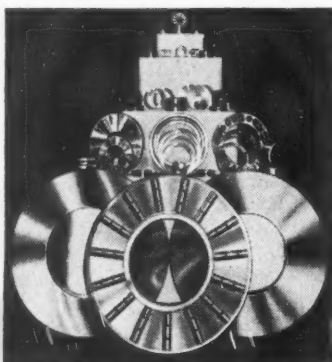
General Offices & Plants

Beaver Falls, Pa. — Seamless Tubing; Welded Stainless Steel Tubing
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Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver, Colo.
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We can make them up to 25" outside diameter. We are geared to handle all of your thrust bearing needs.

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 Special reaming machines for
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THE GAMMONS-HOAGLUND CO.
 MANCHESTER CONNECTICUT

to change jobs just for the fun of changing.

Once the underlying causes have been ascertained, the remedy for excessive turnover may take the form of a simple training program designed to remove these causes. For example, properly conducted training in supervision and in accident prevention will result in improved working conditions and a consequent reduction in turnover. The efficacy of any such training program may readily be measured if management insists that the only yardstick used be that of tangible, demonstrable results.

In other instances a few changes in rules governing management - employee relationships may do the trick, providing these changes are carefully brought to the attention of every employee. To be most effective in reducing the turnover rate, most such changes in policy should originate with the employees and be confirmed by management.



Build "tenths of tenths" measuring into your equipment

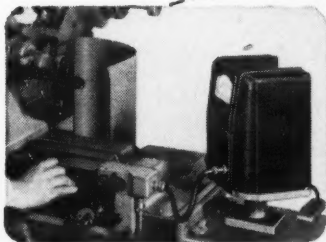
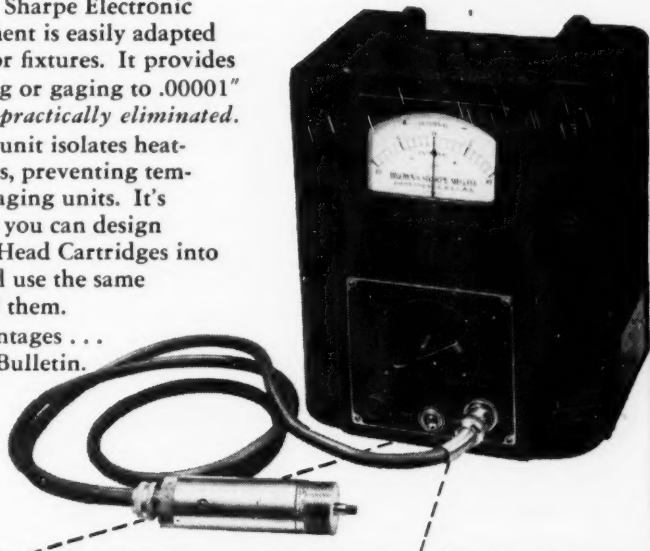
Brown & Sharpe Electronic
Amplifier No. 950 for .0001" to
.00001" readings. Gage Head
Cartridge No. 953 is plugged in.

Versatile Brown & Sharpe Electronic Measuring Equipment is easily adapted to your machines or fixtures. It provides fast, accurate setting or gaging to .00001" *with human error practically eliminated.*

Separate amplifier unit isolates heat-producing elements, preventing temperature drift in gaging units. It's economical, too — you can design inexpensive Gage Head Cartridges into several fixtures and use the same amplifier for all of them.

Learn all the advantages . . .
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Electralign — an application on Brown & Sharpe's own grinding machines. Permits fast, accurate setting of swivel table for grinding of straight work or exact tapers . . . after a single trial grind.



Special fixture utilizes Gage Head Cartridge and Amplifier to measure internal angle accuracy to $\pm 1\frac{1}{2}$ seconds independently of bore size and without reference to locating surface.

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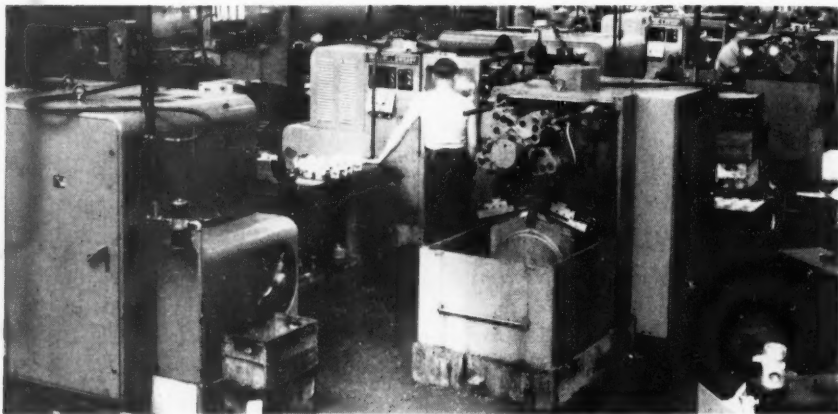


MODERN EQUIPMENT AT WORK

Newly Installed Chucking Machines Effect Savings at Kidde

A SUBSTANTIAL increase in production and greatly reduced labor costs are said to have resulted from the recent installation of six new Warner & Swasey automatic chucking machines at Walter Kidde & Company's Belleville (N. J.) plant. The cost ratio on finished parts is 3.5 to 1 in favor of the new machines.

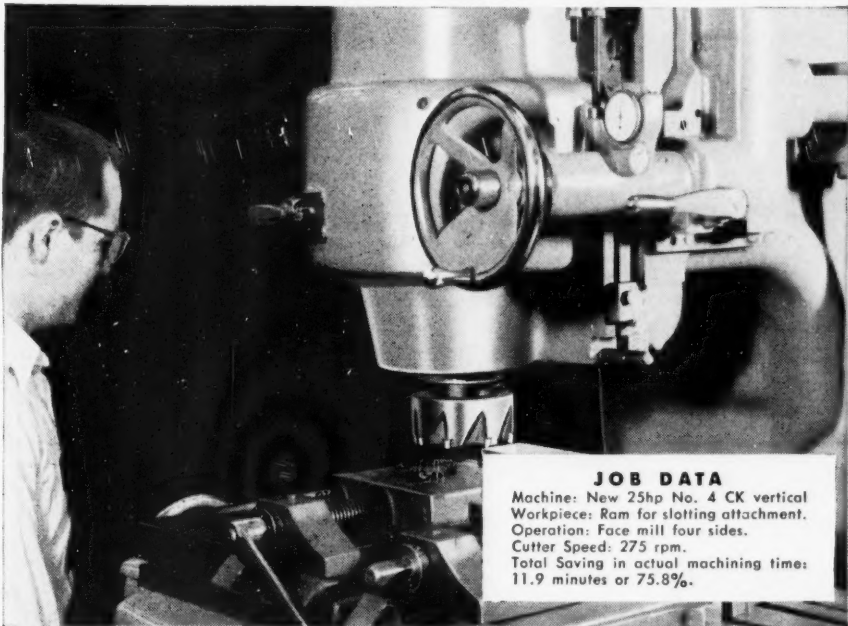
Turning and chucking operations on nine different parts, formerly done on turret lathes, are now performed on the new equipment and represents a wide variety of operations. Turning heads and cross slide cutter blocks, for combining turning and boring cuts, perform five separate sets of operations automatically. Adjustable trips on the selector drum control the feed, speed changes, and length of the cutting stroke. Either or both cross slides can be selected to operate with any or



These six new Warner & Swasey automatic chucking machines at the Walter Kidde & Company plant have resulted in a 3.5 to 1 cost ratio saving on finished parts over the formerly used turret lathe method. The machines automatically chuck and turn nine different parts during five separate sets of operations.

FACTS TELL THE STORY...

NEW KEARNEY & TRECKER CK MILLING MACHINE CUTS PRODUCTION TIME 75%



JOB DATA

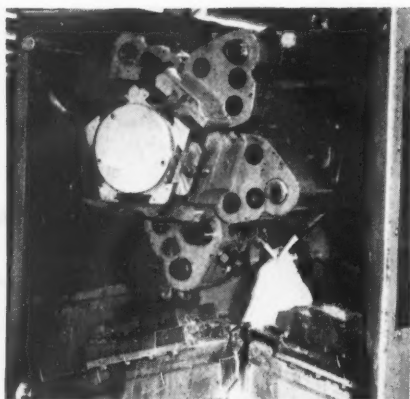
Machine: New 25hp No. 4 CK vertical
Workpiece: Ram for slotting attachment.
Operation: Face mill four sides.
Cutter Speed: 275 rpm.
Total Saving in actual machining time:
11.9 minutes or 75.8%.

C-K Milling Machine Features that help do this job BETTER

- Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.
- CK's positive lubrication plus generously proportioned gears and shafts assure cool, trouble-free operation under heaviest load conditions.
- CK's 3-bearing spindle and flywheel assured fast metal removal, excellent finish.
- 24 different spindle speeds (13 to 1300 rpm) plus 32 different table feeds ($3\frac{1}{4}$ " to 90" ipm) meant operator selected exact combination to take full advantage of high horsepower and modern tools.
- Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut permitted heavy cut.
- Greater Horsepower permitted operator to get maximum production from his modern cutter.

It will pay you to see the new CK line of milling machines — check them against your own requirements. You'll notice how every feature is designed and job-proven to give you cost-cutting results — greater machine capacity, productivity and better finished products. So, for the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.





This illustration shows the multiple turning heads and cross slide cutter blocks on Kidde's new Warner & Swasey machines.

all turret faces, while tools used in the screw machines can be used in the heads of the Warner & Swasey machines.

Accessibility to the tools and set-up controls is said to make the operator's job easy, safe, and fast. Two or more machines are controlled by each operator and his job is limited to changing the pieces and starting and stopping the machines. All other operations are predetermined by the operational set-up and controlled automatically.

Twenty - Two - Foot Stroke Hydraulic Cylinder Used in Honing Tubing

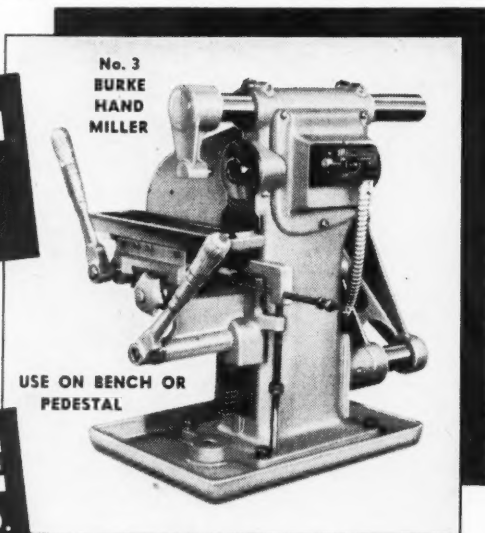
USING a 22-foot stroke hydraulic cylinder built from standard-type cylinder parts by the Miller Motor Co., Melrose Park, Ill., the Planet Products Company of Cincinnati, Ohio, has designed and constructed a most efficient and completely automatic cylinder-operated honing machine that hones air

**Rugged! Rigid! Accurate!
Economical!**

**LOW COST OPERATION
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MILLING MACHINES**

Send for circular describing various models of power and hand feed millers and attachments.

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MACHINE TOOL CO.**



A Division of the U. S. Burke-Machine Tool Co.
Brotherton Road 3, Cincinnati 27, Ohio

Because your Blanchard Grinder deserves the best

USE BLANCHARD GRINDING WHEELS

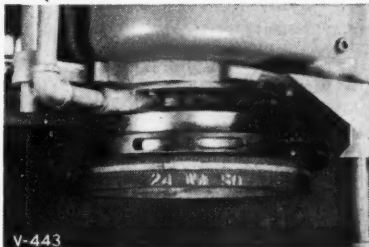
25 years of experience in building both grinders and wheels puts Blanchard in a unique position to give you the best results in surface grinding. There is a *correct* Blanchard Wheel for your work, whether it is as tough as copper or fragile as glass — whether it involves long or short runs — whether it demands heavy stock removal or finishes to 1 microinch — whether it requires clean-up cuts or flatness to .000005"! Top economy and production result only when you use the correct wheel for each individual job. Your nearest Blanchard representative will be glad to put his experience to work for you.



THE BLANCHARD MACHINE CO., 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Also investigate **THE BLANCHARD CYLINDER WHEEL HOLDER!**

This new device eliminates sulphuring and thus reduces downtime. It's a real time, money and trouble saver. Grinder head is merely lowered onto wheel — clamps quickly secure the wheel — you're ready to grind! Available for 10", 11", 16", 18" and 20" Blanchard Wheels.



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Please send free copy of Blanchard Wheel Booklet and Wheel Holder Folder.

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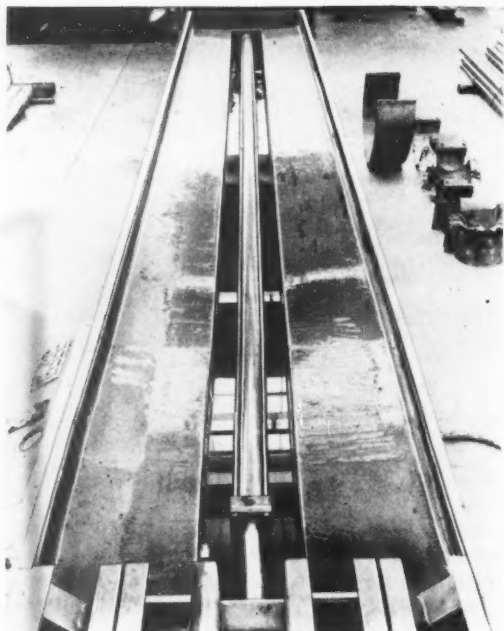


Illustration showing 22-foot stroke hydraulic cylinder used in honing machine constructed by Planet Products Company to hone air and hydraulic cylinder tubing

weight, is a 4-inch bore double-acting low-pressure hydraulic cylinder. The 24-foot long piston rod is $2\frac{1}{2}$ inches in diameter and is hard chrome plated to resist nicks and scoring. The cylinder has "space-saving" square, solid steel heads and caps; dirt wiper seal; patented leakproof rod seal that is said to never require adjustment and automatically compensates for wear; and other standard Miller features.

and hydraulic cylinder tubing to a 15-micro-inch finish in up to 22-foot lengths and in up to 20-inch bores. The 22-foot stroke cylinder is used on this machine to operate the honing machine carriage continuously back and forth at 120 feet per minute.

The unusual cylinder, which features a 24-foot long solid steel piston rod that does not sag under its own

Electric Box-Type Furnace Increases Efficiency of Heat Treating Dental Forgings

THE accompanying illustration shows a technician removing dental forgings from a General Electric box-type furnace at the S. S. White Dental Manufacturing Company, Philadelphia. Use of this furnace and an-

WALTHAM SUB-PRESSES . . . for precision work



Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes. Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use.

Write for further information.

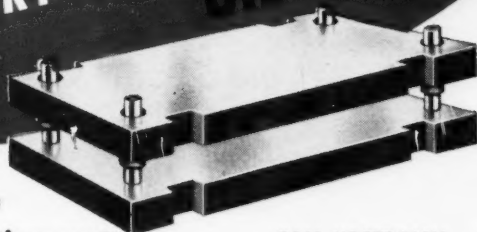
WALTHAM MACHINE WORKS



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"DETROIT" means...

**FACTORY-ASSEMBLED
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**with "DETROIT"
you save mounting costs,
increase production runs**

First: "Detroit" craftsmen, working with finest precision equipment, take pride in the superior quality of every "Detroit" Die Set. **Second:** Every set is fully assembled and inspected at the factory. Here are complete inspection facilities and testing skill that mean each "Detroit" Die Set is right before it is shipped.

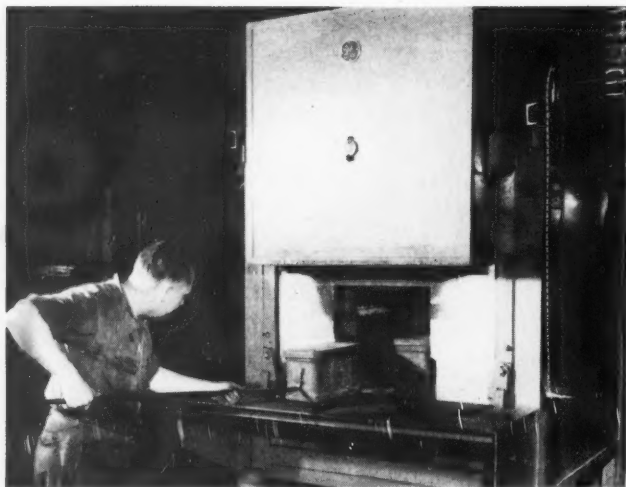
For prompt delivery, or information, call your "Detroit" representative.

CALL "DETROIT"

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DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. • DETROIT 2, MICH.

**DETROIT
DIE SET ★**



A technician at S.S. White Dental Mfg. Co., Philadelphia, Pa., is shown removing dental forgings from a General Electric box-type furnace.

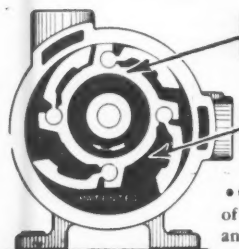
according to White Company engineers.

The 220-volt model shown has a temperature rating of 1,850 deg. F. and a capacity of 200 forgings a day of both carbon and stainless steel.

other similar to it has resulted in faster production, fewer rejected pieces, and more uniform hardness of the tools,

The forgings are heated for eight hours and then allowed to cool overnight before being removed. White

LEIMAN AIR PUMPS give you Greater Capacity!



SMALLER PISTONS

provide

LARGER AIR SPACE

HINGED WINGS

take up their own wear

• Compare this cross-section of a Leiman Air Pump with any other rotary pump. It is working air space that counts—and Leiman provides 2 to 3 times more area, per size and weight of pump.

What's your air application? Send us details. Leiman engineers offer over 60 years' experience on thousands of air applications.

CATALOG AND APPLICATION DATA SENT ON REQUEST.

For Pumps—write DEPT. A.

LEIMAN BROS., INC., 168 Christie St., Newark 5, N. J.

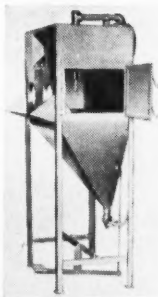
HANDLE your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space—run at lower r.p.m.—have fewer moving parts—no springs, gaskets or packing—no tips to renew—nothing to give trouble.

**Metal Cleaning and Finishing
without acids or scratch brushes**

LEIMAN SANDBLASTS

Fast, low-cost, safe, uniform way to clean scaly, rusty, rough surfaces—prepare for plating and finishing—stencil letters and designs—more rapid matte or satin finishes. Use unskilled help. For Sandblasts—

write DEPT. B



A Complete Line of Dial Indicators and Dial Gauges— for EVERY DIMENSIONAL PROBLEM



● For more than 50 years, B. C. Ames Co. has produced the highest quality micrometer dial indicators and micrometer dial gauges. That's as true today as ever—and it's one reason why Ames' Products are in such great demand.

As always, only the highest quality materials are used by the skilled craftsmen who build the fine line of Ames' measuring instruments. The same high standards of precision inspection insure that Ames' gauges and indicators will stay right on the job.

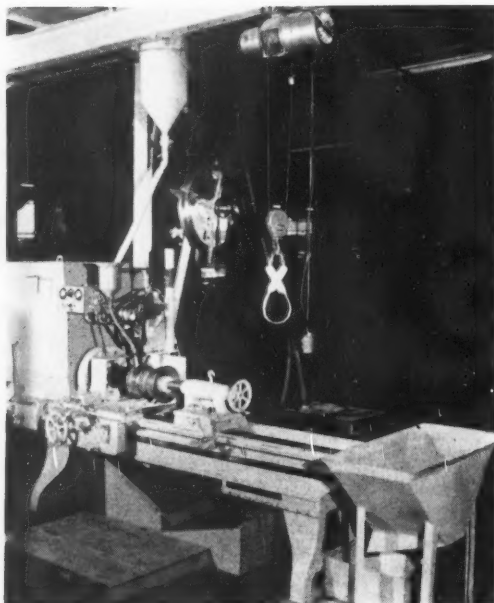
Ames' measuring instruments can be had to ASTM and TAPPI standards—or if you have a special measuring or quality control problem, let our engineering department assist you. We've made gauges for measuring such diverse things as primer charges and potato chips. Write B. C. Ames Co., today.

Representatives in
principal cities.

B. C. AMES CO.

29 Ames Street
Waltham 54, Mass.

Mfg. of Micrometer Dial Gauges • Micrometer Dial Indicators



A small-size tractor roll is shown being built-up by Unionmelt welding. An extension of the line center permits handling of larger rolls directly over the trough at the right.

Machine Aids Tractor Roll Welding

TRACTOR rolls are built-up easily and economically on a welding machine built from a lathe and standard "Unionmelt" welding equipment by the J. D. Pittman Tractor Company of Birmingham, Alabama. Worn rolls are rotated beneath the welding head mounted on the movable saddle. Weld metal is evenly applied, speedily rebuilding the rolls and minimizing finishing operations. Troughs located beneath the

work collect unused Unionmelt welding composition for re-use.

Company engineers state that electric heat is more satisfactory than previous means used in processing because it is more constant, having less than 15 per cent variation. In addition, the forgings are said to be more uniform in hardness, facilitating machining and bending and resulting in fewer rejected pieces and faster production. The pieces are claimed to average 85 to 90 Rockwell B.

Hobbing Press Has Special Use in Aircraft Engine Production

THE accompanying illustration shows a hydraulic hobbing press of 2,500-ton capacity recently built by the



DIRECTS A BEAM OF WHITE LIGHT ON YOUR CLOSE PRECISION WORK

**Uneeda
LIGHT**

Tool and Die Makers acclaim it for utility, getting into nooks or crevices hard to reach with ordinary light—for lining up punches in dies or working with the scriber in close places. Completely adjustable and portable. Light does not reflect back to your face. Ideal for inspectors seeking burrs, flaws, etc.

Price complete with 2 size bulbs \$13.75

Write for Literature

**TWENTIETH CENTURY
MANUFACTURING CO.**

2724 MONTROSE AVENUE CHICAGO 18 ILLINOIS

*"— and they chopped down
the Old Pine Tree."*

Woodsmen Use Marking Devices!

When a forester indicates a tree is to be cut by the lumberjack he usually paints a mark just above the ground and another about breast-high, indicating it is to be cut for lumber purposes. If the tree is diseased he usually marks it with an X or other suitable device, indicating that it is to be cut for destruction or firewood.



CADILLAC MARKING DEVICES are Designed for ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC stands ready to supply or design and build to meet your needs.



**HEAVY BEVEL
HAND STAMPS**
CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.

INTERCHANGEABLE TYPE and TYPE HOLDER SETS

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.



**HAND STAMP
SYMBOLS**
A system of distinctive symbols for inspection and confidential markings. Write for Symbol Chart.



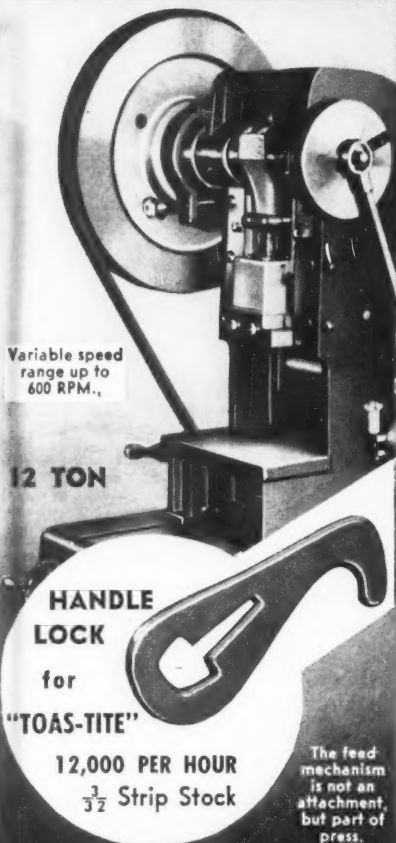
CADILLAC STAMP CO.

17319 RYAN ROAD • DETROIT 12, MICH.
3000 IRVING PARK • CHICAGO 18, ILLINOIS



Automatic HIGH SPEED FLEXO-PRESS

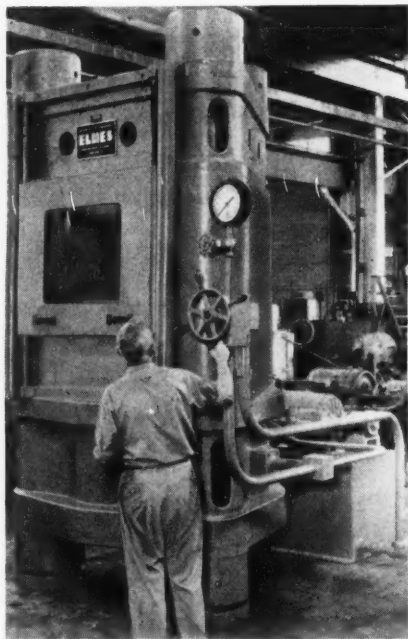
High Production — Low Cost



Center line of feed roll to die is very short
—increasing production as much as 200%.

Precision Flexopress Corp.
910 Baymiller St. Cincinnati (3) Ohio

Elmes Engineering Division of American Steel Foundries, Cincinnati 29, Ohio, for a leading manufacturer of aircraft gas turbine engines and accessories. The press has an unusual application. Ordinarily, hobbing presses are used for sinking desired impressions into blocks of prepared steel, thus



This 2,500-ton hydraulic hobbing press is used primarily for die quenching by a leading manufacturer of aircraft gas turbine engines and accessories.

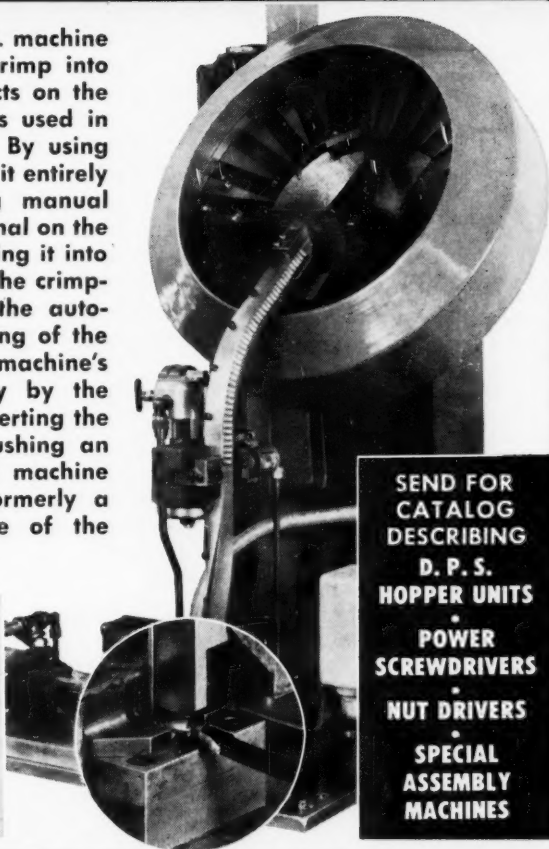
forming duplicate die inserts, multi-cavity molds, and single molds with intricate contours. In the case of this particular manufacturer, the press is used primarily for die quenching. This operation involves a quick-cooling of hot forgings while restrained in a die under extremely high pressure, thereby maintaining maximum accuracy while de-

Here's another instance where D.P.S.
MOTORIZED HOPPER UNITS
are proving
A HIGHLY PROFITABLE INVESTMENT!

Pictured is a special D.P.S. machine designed to insert and crimp into place the terminal contacts on the ends of spark plug wires used in the automobile industry. By using a motorized Hopper Unit, it entirely eliminated the fatiguing manual work of placing the terminal on the wire by hand, and inserting it into a small press to provide the crimping operation. Through the automatic selecting and feeding of the brass terminal clips, the machine's output is governed only by the operator's dexterity in inserting the wire in the nest and pushing an electric foot switch. The machine eliminated what was formerly a bottleneck in this phase of the automobile industry.

**D.P.S. POWER-DRIVEN
EQUIPMENT CAN HELP
YOU SPEED-UP YOUR
ASSEMBLY
PRODUCTION**

Tell Us Your Problem



**SEND FOR
CATALOG
DESCRIBING
D. P. S.
HOPPER UNITS
•
POWER
SCREWDRIVERS
•
NUT DRIVERS
•
SPECIAL
ASSEMBLY
MACHINES**

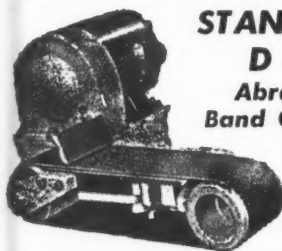
DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST.

DETROIT 16, MICHIGAN

veloping high physical properties.

General specifications for the press illustrated are as follows: weight, approximately 50,000 lb.; overall height, 10 feet 8 inches; distance between columns (left or right), 39 inches; maximum opening (platen to head), 32 inches; stroke, 15 inches; advance speed, 10 inches per minute; pressing speed, $\frac{1}{2}$ inch per minute; and return speed (gravity), 20 inches per minute.



**STANDARD
D - 4
Abrasive
Band Grinder**

Famous
for
Stamina

This new, streamlined bench type grinder, assures fast, quality finishing on metals, plastics, wood, fibre... at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. $4 \times 36\frac{1}{4}$ " band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

333 Nassau Avenue, Brooklyn 22, N. Y.

Special "Portelvators" Solve Problem of In-Work Handling

THE problem was unique. Prompt delivery of each order was dictated by the nature of the industry, in spite of the fact that one or several operations must be performed after the order was received. Material in quantity could be processed through the primary operation however, and sent to storage to await subsequent operations; and since this procedure brought about substantial savings, it was adopted.

Subsequent operations, however, involved frequent and complex handling which threatened to abolish the savings effected at the primary stage in processing. Thus, a quantity of material removed from storage for operation "2" would be split three ways for operations "3A," "3B," and "3C," and each of these quantities split again for operation "4A," and so on. During this processing, part of the material would be sent back to storage following each operation, thus maintaining a perpetual inventory of material in each stage of process except the final stage.

The two special "Portelvators" shown herewith were designed and

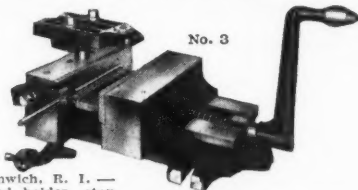
Standard GRAHAM VISES and ATTACHMENTS CUT DRILLING COSTS OF SMALL PARTS!

... replace expensive drill jigs and fixtures for simple, repetitive operations.

Attachments provide adjustable positive locations. Meehanite construction. Removable jaw facings of hardened and ground steel. Adaptable to all types of drills, millers, planers, shapers, surface grinders.

NO. 3 — JAWS, 6" W, 11 $\frac{1}{2}$ " H, OPEN 41 $\frac{1}{2}$ " — \$65.00
NO. 4 — JAWS, 9" W, 2" H, OPEN 7" — 97.00
NO. 5 — JAWS, 12" W, 21 $\frac{1}{2}$ " H, OPEN 91 $\frac{1}{2}$ " — 157.50

Order today ... immediate delivery. Prices — FOB East Greenwich, R. I. — include set of attachments: bushing holder stand, bushing and holder, stop holder, stop rod, stop. Vise available without attachments.



Write for illustrative literature

The GRAHAM MFG. CO., Inc. 42 BRIDGE STREET, EAST GREENWICH, R. I.

GAIN THE

Full Benefits of

MAGNETIC CHUCKING

NEUTROL

**ELECTRO-MAGNETIC
CHUCK CONTROLS**

Release and demagnetize work pieces simultaneously. No time lost. No damage to work or to chuck faces. Protect chucks from voltage surges. Speed production.



Manual or Motor Control Models for 50 to 5000 Watts. Chuck area 60 to 7500 Sq. In. Special Models to Suit.



**ELECTRO-MATIC
RECTIFIERS**

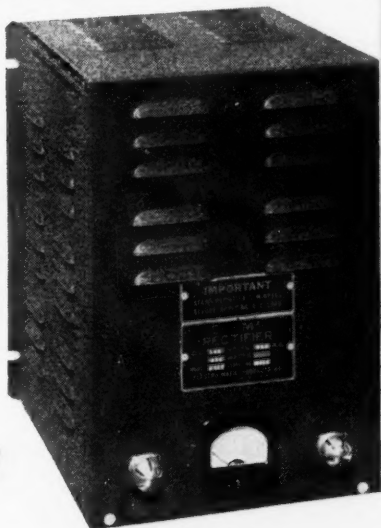
Engineered for dependable power conversion for industrial purposes. Most models equipped with automatic electronic *Time Delay Switch*, adding years to tube life. Quiet and efficient. Fully guaranteed.

Full Particulars Without Obligation

ELECTRO-MATIC PRODUCTS COMPANY

2235 North Knox Avenue
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32
MODELS
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50 to
20,000
Watts



ERRINGTON
Scores Again!

**FULLY
ADJUSTABLE
DRILLING
HEAD**



SIZES: 0 to 1/4"
3/16" to 1/2"
NO. 2 M.T. Socket Capacity

Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns. Head is fully geared. Grooved ball thrust bearings on all spindles. Needle bearings wherever possible. Simple locking arrangements. All moving parts hardened. Heads made with 3, 4 and 6 spindles.

Write for Complete Information

ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK

Only **ERRINGTON** *Adjustable*
TAPPING HEAD
Offers So Many Advantages



- Fully geared
- Needle bearings on all spindles in head
- Ball thrust bearings throughout
- Bronze bushed
- Sand cast aluminum case
- All parts fully enclosed for pressure lubrication and protection
- Max.-clip positive clamping on all adjusting members

Sizes: #0 - #10 Tap to 5/16"
No. Spindles: 2 to 6

Here's a versatile tool which permits you to take advantage of a wide range of adjustment — without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

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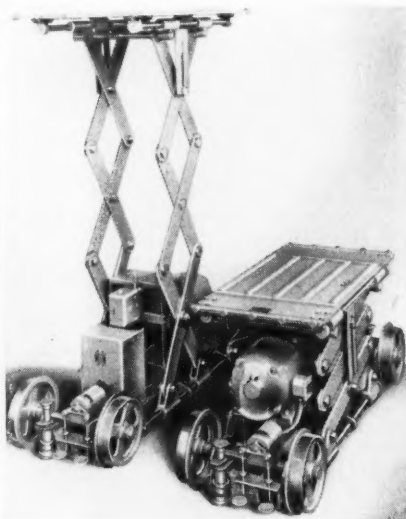
ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK

built by The Hamilton Tool Co., Hamilton, Ohio, to meet the storage requirements of this situation. They are operated on a track which skirts the storage shelves and processing stations, are moved manually from one station to another station, and are elevated electrically.

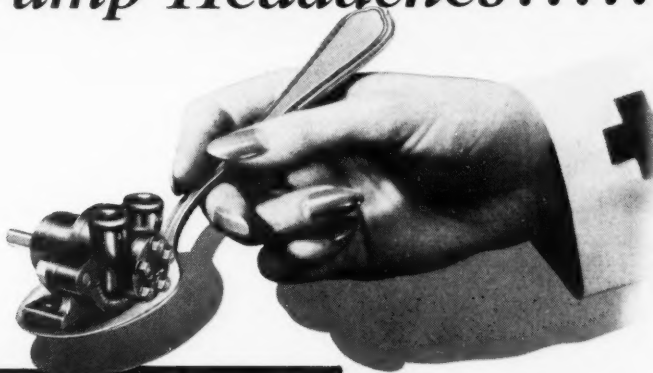
Features of each unit include a scissor type lift mechanism, operated by 1 h.p. elevator type motor through stand-



Special "Portelvators" built by The Hamilton Tool Company to solve problem of in-work handling

ard Portelvator worm, worm gear and screw power transmission; motor, actuated through foot control from either end of table; electrical controls, including gear-driven limit switch and reversing magnetic starter; and free-rolling conveyor type top. Table size is 24 inches wide x 36 inches long. Lift ranges from 24 to 64 inches above floor level. Load capacity is 600 lb. Lift rate is 40 inches per minute.

for Pump Headaches.....



**Specify TUTHILL PUMPS
for LUBRICATION
COOLANT
FUEL and LIQUID TRANSFER
HYDRAULIC MECHANISMS**



MODEL C
(General Purpose)

For use with non-corrosive liquids. Low cost, low maintenance. Compact. Capacities to 200 g.p.m. and pressures to 100 p.s.i. Direct drive or belted units.



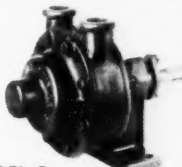
MODEL CK
(High Pressure)

Compact, ball-bearing pump in capacities up to 50 g.p.m. and pressures to 400 p.s.i. Direct drive or belted units.



MODEL M
(Coolant)

Has built-in automatic by-pass for protection against excessive pressure; also compensates for wear. Capacities to 50 g.p.m.



MODEL R
(Automatic Reversing)

Delivers from same port regardless of direction of shaft rotation without check valves. Capacities to 200 g.p.m.



MODEL L
(Small Industrial)

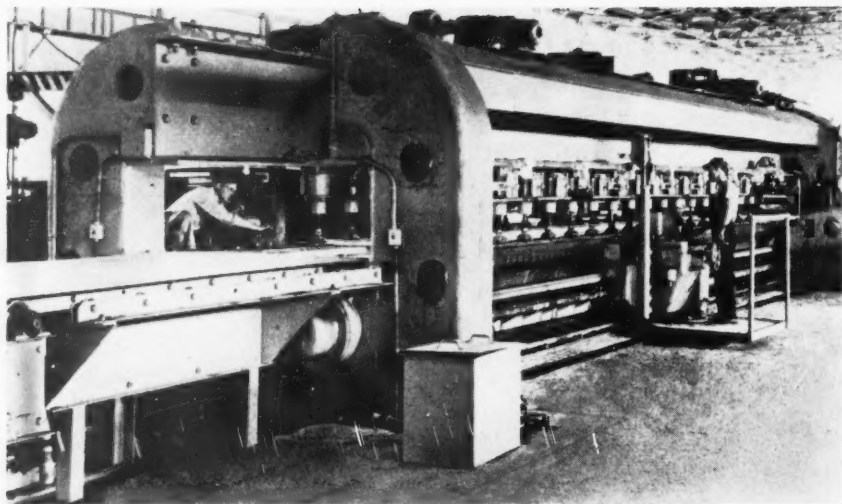
Mechanically sealed for leak-free service and low power consumption. Capacities to 3 g.p.m. and pressures to 600 p.s.i.

Write for Tuthill Pump Guide to help you select the exact pump for the purpose, whether it be for replacement or a new application on original equipment.



TUTHILL
Pump Company

939 East 95th Street, Chicago 19, Illinois



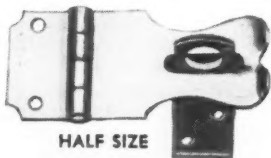
Dual planer used in simultaneously planing both welding edges of plates for the production of natural gas pipe lines

Dual Planer Simultaneously Planes Both Welding Edges of Pipe Line Plates

BY putting two 32-foot Baldwin planers together, a certain metal-working firm is now able to simultaneously plane both welding edges of plates for the production of natural gas pipe lines. The dual planing operation is said to assure parallel edges and uniform plate widths so that plates can be rolled and welded into accurate cylinders. Hundreds of miles of 24 and 30-

inch diameter pipe have started in this dual planer, built by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

The dual planer bed can be adjusted for plate widths of 61¼ to 115 inches. Multiple pneumatic clamps hold the plates during planing operations. Carriages on each side of the planer bed have reversible tool heads, each equipped with five tools arranged for cutting on the forward travel and five arranged for cutting on the return travel. Each tool can machine approximately 1/16 inch from the edge of a 1/8-inch plate.



HALF SIZE

HASP & STAPLE

S & S HINGE AND METAL PRODUCTS CO.

4725-4735 IOWA ST.

DEPT. M

CHICAGO 51, ILLINOIS



WITH OR WITHOUT HOLES

Butts and Continuous Hinges for
Cabinets, Cases, etc.

Here's the Line-up



"TUF-FLEX"® HAND BLADE — the super-tough, super-flexible blade made of a patented special alloy steel. Greatest of all general purpose hand saws.



"BLU-FLEX"® HAND BLADE — the remarkable new, flexible, high-speed blade. Unbreakable in use. Most economical blade ever made for hand sawing hard alloy steels.



"BLU-MOL"® POWER BLADE — the high-speed blade that is making industrial hacksawing history. Unequalled by any other metalcutting blade for general, all-purpose power hacksawing.



"JET-EDGE"® POWER BLADE — the sensational new, high-speed, welded-edge blade. Unbreakable and shatterproof even under toughest cutting conditions.

that is cutting metals faster and cheaper in thousands of plants

Every day, more companies standardize on Millers Falls — the world's broadest and most highly developed line of metalcutting saws.

On job after job, they have cut costs 20% and even more. They can do the same for you. Each is the result of Millers Falls constant research for finer steels . . . better cutting designs . . . more effective heat treating methods.

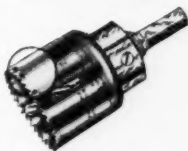
Write for full details, or let us arrange a demonstration.

MILLERS FALLS COMPANY,
Greenfield, Massachusetts



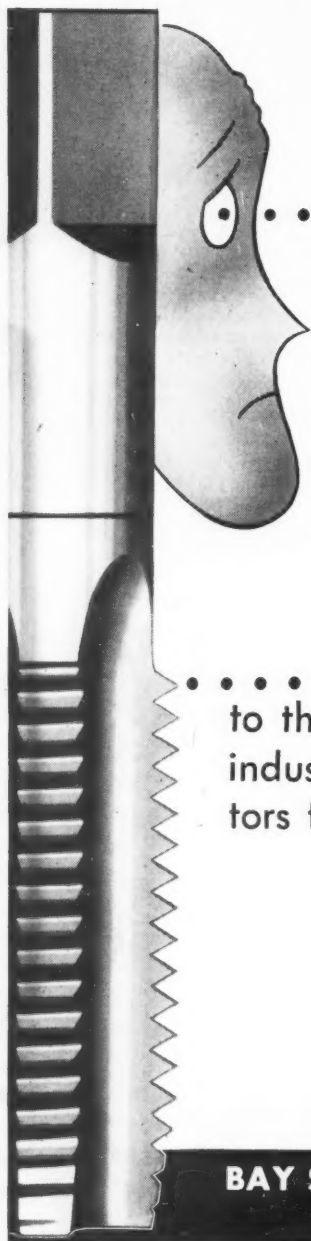
The Mark of Superiority

"BLU-MOL"® HOLE SAWS — high-speed, welded-edge. Cut any machinable material. Follow-through pattern. 40 sizes from $\frac{9}{16}$ " to $4\frac{1}{2}$ ".



BAND SAWS — sizes and types for every use. In coils or welded to fit any machine. Individually boxed for easy handling.





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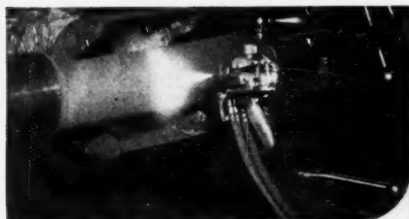
MANSFIELD • MASSACHUSETTS

NOW... new gun
makes metallizing
a bigger
time-and-money
saver
than ever before



Salvaging worn feed roll journal for textile mill.

Building up 6" dia. by 12" lg. bearing section on shaft from heavy duty crusher with .25 carbon steel.



New Metco Type 4E gun sprays 40% faster than older models; produces uniform coatings with minimum operator skill; lower cost operation with minimum maintenance.

Here is another Metco development that makes metallizing a still more profitable tool for the modern machine shop. It's the new Metco Type 4E Gun. With the older types of metallizing guns, constant operator attention was required to maintain oxygen and gas pressures within a close range to obtain uniform coatings. Now, with this new gun, gas pressures are automatically balanced against variations as great as 10 lbs. Now, so little operator attention or skill is required, that the gun almost runs itself.

In addition to this advantage, the Metco 4E gun sprays up to 40% faster than older models. Wire feed is also controlled automatically for any wire size, from 20 B&S gauge to 1/8", in any metal.

Add to these advantages the recent development of the new metallizing material, Sprabond Wire, which bonds itself to smooth steel surfaces without any mechanical preparation except cleaning. It serves as the perfect preparation coating for spraying with any other finish metal.

Free Bulletin or Shop Demonstration—Send off the coupon below for detailed information. Or, better yet, ask for a demonstration in your own shop by a Metco Field Engineer. He will be glad to show you how the new Metco 4E gun works on jobs of your own. No obligation, of course.

The following names are the property of Metallizing Engineering Co., Inc.: Metco®, Sprabond Wire.

*Reg. U. S. Pat. Off.

REPAIR COSTS RUN AS LOW AS 10% OF REPLACEMENT COST

Metallizing gets worn parts like these back in service faster and at lower cost than any other method of repair:

Air Compressor	Patterns
Parts	Pistons
Armature Shafts	Piston Rods
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Hydraulic Rams	Rolls
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Journals	Squeeze Rolls
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R. J. McWaters
Metallizing Engineering Co., Inc.
38-17 30th St., Long Island City 1, New York

☐ Please send me further information on the Metco 4E gun.
☐ Please arrange a free demonstration in my shop.

NAME _____
COMPANY _____
STREET _____
CITY _____ ZONE _____ STATE _____

METALLIZING ENGINEERING CO., INC.

38-17 30th STREET

LONG ISLAND CITY 1, N. Y.

In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chesham near Woking, England



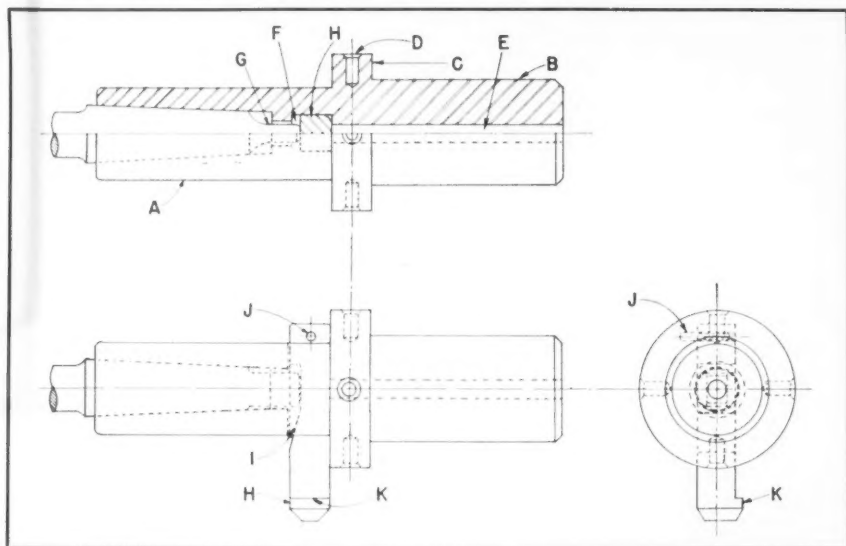
IDEAS FROM READERS

Taper Shank Drill Holder with Self-Ejecting Mechanism

By W. M. HALLIDAY
England

THE accompanying drawing shows a time-saving economical-to-make holder specifically designed to facilitate the mounting and removing of

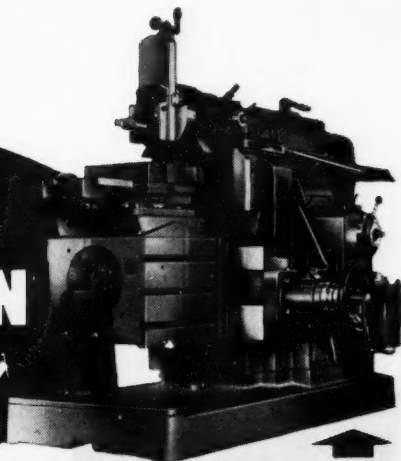
Morse taper shank drills, reamers, boring bars, and similar cutting tools used in conjunction with turret lathes, drilling machines, boring mills, milling machines, and other machine tools. The holder incorporates a self-ejecting mechanism for the cutting tool, thus eliminating the need for using a separate tapered drift in removing the tool and thereby saving considerable time



Drawing of taper shank drill holder with self-ejecting mechanism



**"TODAY...IT'S
PRODUCTION
THAT COUNTS"**

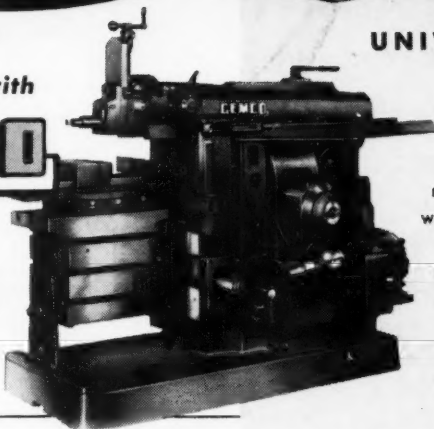


**... BEAT COSTLY
OBsolescence with**

GEMCO

**PRECISION
SHAPERS**

**SAVE TIME...
SAVE LABOR...**



**UNIVERSAL
TYPE**

For tool and
die work and
general
machine shop
work requiring
frequent
changes and
angular set-
tings. Avail-
able in sizes
from 16" to
36" stroke.

PRODUCTION TYPE

For general machine shop use and heavy
production work. Available in sizes from
16" to 36" stroke.

LUBRIGARD PROTECTED

• **PLAIN TYPE SHAPERS**
... available only in sizes 16" and 20" stroke



WRITE FOR BULLETIN

LUBRIGARD PROTECTED

GEMCO

SHAPER Company

**4417 OLEATHA AVE.
ST. LOUIS 16, MO.**

PRECISION MACHINERY SINCE 1917

when changing over a tooling setup. Use of the holder is also said to prevent damage to the tang portions of tools.

Referring to the drawing, the holder consists of a cylindrical mild-steel body, **A**, which is provided at one end with a rigid parallel shank, **B**, by means of which the entire holder may be mounted and locked in the hole of a lathe turret. The particular design of

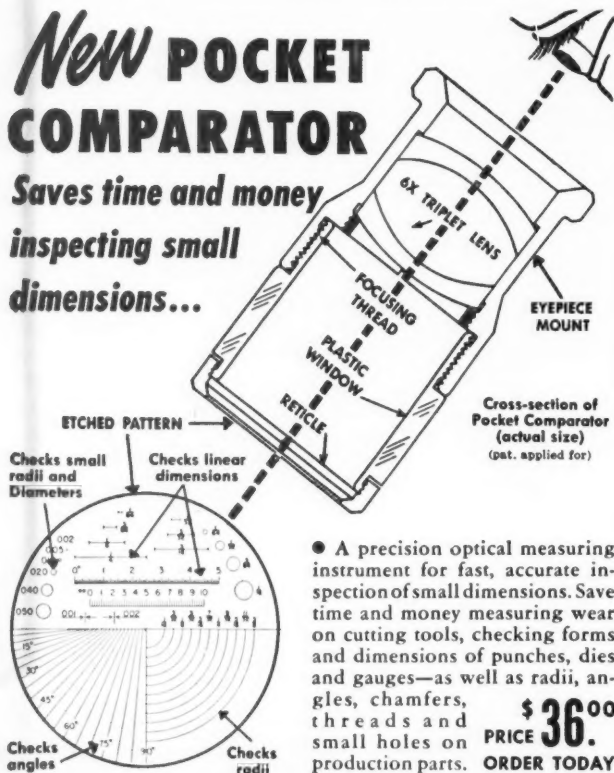
holder shown is intended primarily for use with a turret lathe having a number of plain parallel holes in the turret for the location of tools. If preferred, the shank **B** may be machined to any convenient size of Morse taper for insertion directly in a machine spindle.

An enlarged diameter shoulder, **C**, is provided at a point approximately midway along the length of the holder. The right-hand surface of this shoulder

acts as a positive stop to arrest any tendency of the holder to slide back in the turret during cutting operations. The portion of the holder to the left of shoulder **C** is made slightly smaller in diameter and parallel for its full length and is accurately bored out concentrically with the shank **B** to provide the Morse taper hole in which the shank of a drill, reamer, or other cutting tool may be inserted in the usual manner. Equally spaced around the periphery of shoulder **C** are four blind tommy pin holes, **D**, which facilitate setting, adjustment, or removal of the holder.

New POCKET COMPARATOR

Saves time and money inspecting small dimensions...



● A precision optical measuring instrument for fast, accurate inspection of small dimensions. Save time and money measuring wear on cutting tools, checking forms and dimensions of punches, dies and gauges—as well as radii, angles, chamfers, threads and small holes on production parts.

\$36.00
PRICE \$36.00
ORDER TODAY

Write for **FREE** descriptive folder
a product of **BELL & HOWELL CO.** distributed by
See Your National Tool Co. Representative or Local Jobber
NATIONAL TOOL CO.
11230 Madison Avenue Cleveland 2, Ohio
NATIONAL Tools CLEVELAND

**INCREASES
PRODUCTION...**

LOWERS COSTS...

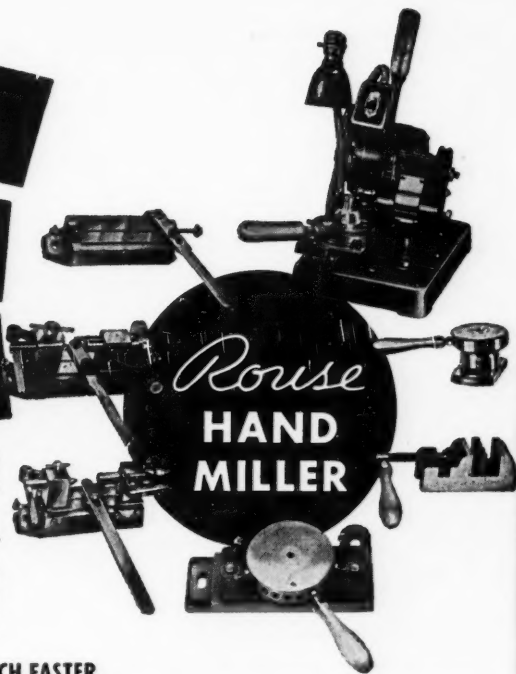
**PAYS FOR ITSELF
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastic, and other materials—fast, accurately, and at very low cost. Only \$106.00*.

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{4}$ H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—\$29.00*.

*All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
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The remaining portion of the body **A** is drilled concentrically at the right-hand end to produce the ejector hole **E** which extends fully into the tapered hole at the front end of the holder. The hole **E** is rarely required during normal use of the holder and is provided only as a safeguard in the event a drill becomes jammed and is too tightly wedged to permit release by the regular ejector mechanism of the holder. In such instances, the ejector slide is

removed and a rod inserted in hole **E** to enable the jammed drill to be hammered out.

Immediately to the left of shoulder **C** a rectangular slot, **F**, is machined completely through the forward portion of the holder. The slot is located centrally with this portion of the holder and extends for a certain distance through the narrow slot left at the bottom of the tapered hole and into which the tang, **G** of the cutting tool would

normally fit. Situated so as to move easily within the slot **F** is the rectangular ejector slide **H**, which preferably should be made of cast steel and well-hardened and tempered before use. On the left-hand side of the ejector slide is an inclined cam face, **I**, which is situated adjacent to the tang **G** of the drill when inserted in the holder. This cam face is also extended to form a parallel flat portion of sufficient depth from the edge of the slide to ensure proper working clearance for the tang **G** when the drill has been properly inserted in the holder **F**. A small

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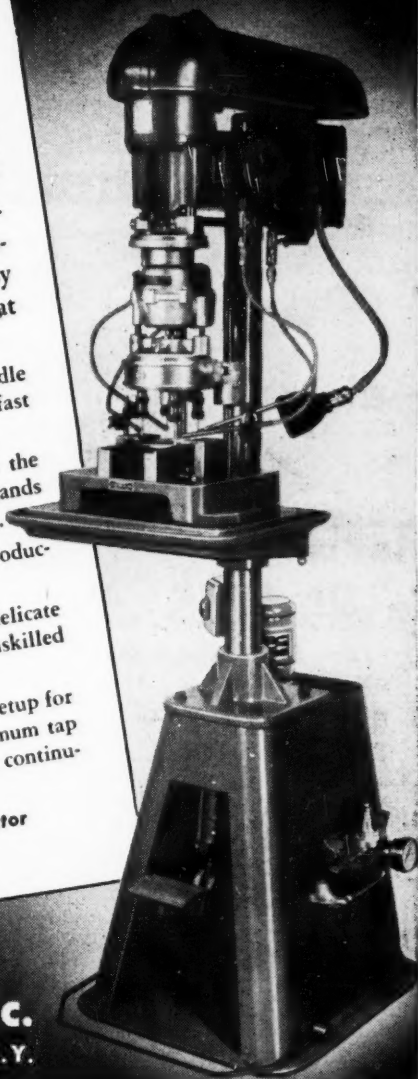
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stop pin, **J**, is threaded firmly into a tapped hole through the end of the ejector slide **H** to prevent the slide from being accidentally withdrawn from the holder. This stop pin also ensures that the inclined cam face **I** can be quickly located to the correct position relative to the drill tang when ejection is about to occur. At the opposite end of the ejector slide (which should project a certain distance out of

the holder) a small raised ledge, **K**, is provided to prevent the slide from being forced too far into the holder. The extreme end of the slide at the same end where ledge **K** is located is amply chamfered on all four sides to form a convenient striking surface and minimize the possibility of burring or damaging the slide during the actuation required in ejection operations.

To use, the holder is mounted in the

lathe turret or machine spindle in the conventional manner by means of the shank **B**, care being taken so as to locate the holder with the shoulder **C** bearing against the face of the turret, or end of the spindle, to prevent the holder from being forced back into the turret. The holder is also located so that the ejector slide is in a horizontal plane, with the stop pin **J** at the rear. A drill or other cutting tool is inserted in the front end of the holder and, after use, is removed by merely delivering a sharp hammer blow to the chamfered front end of the slide **H** which

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causes the slide to move rapidly within the holder, bringing the inclined cam face **I** to bear against the end of the tang **G** and thus quickly forcing out the drill in a manner similar to that when using an ordinary loose drift bar.

To insert a new tool in the holder, the ejector slide is drawn forward until the stop pin **J** once again bears against the side of the holder. For long life, the entire holder should be case-

hardened, especially around the sides of the rectangular slot **F**. The inclined cam surface **I** on the left side of the slide should be hardened and smoothly polished to prevent burring of or biting into the end of the tang **G**.

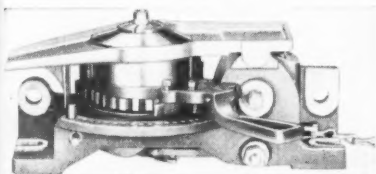
Sawing Steel Stock to Specification

By FRED ROGERS

AFTER a war period of shortages and priorities, the time is arriving again when it behooves the machine designer, the stock cutoff man, and the purchasing agent to help keep steel specifications and orders within certain bounds. When the materials list reaches the steel stockman in the cutoff department, after specification as to sizes have passed from the engineering department through the routing or methods department, the stockman has several choices as to how the material is to be sawed off the bar. If the stock size, for example, is to be 2 x 4 x 6 inches, a bar 2 inches thick x 4 inches wide is cut into pieces 6 inches long, as shown at the upper left of the accompanying sketch. This we will designate as method number one.

When the foregoing size of stock is not available, a piece 2 inches thick x

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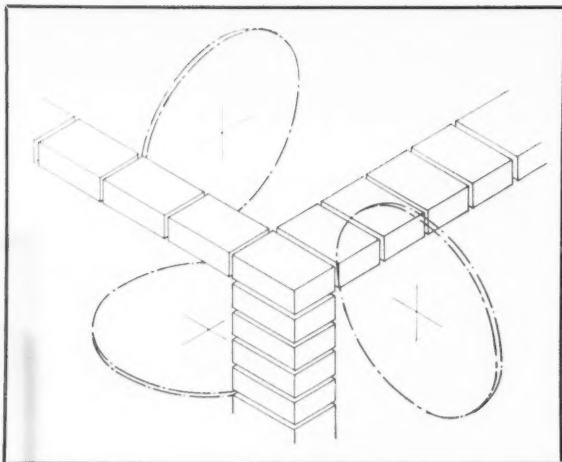
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Sketch illustrating three methods of sawing steel to specification

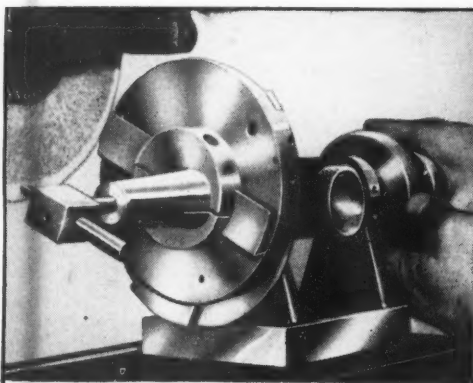
6 inches wide may be cut into pieces 4 inches long, as portrayed at the upper right of the sketch. This is method number two. The remaining choice is to use a bar 4 inches thick x 6 inches

thereby saving space in stock racks.

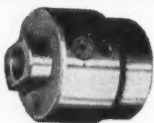
Economically, from the standpoint of sawing off stock, the first method outclasses the other two methods. In the sketch, the ellipses represent a saw

wide and saw it into pieces 2 inches long, as shown at the lower center of the sketch. This is the third method.

It would be well for the specification man to keep this sketch in mind as it will save endless delays in ordering superfluous stock. Its use will also help reduce steel stock inventory,



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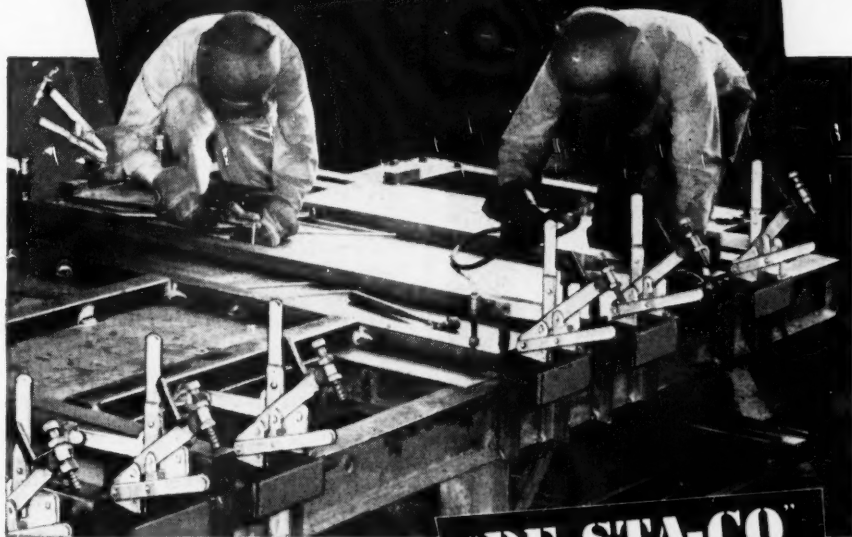
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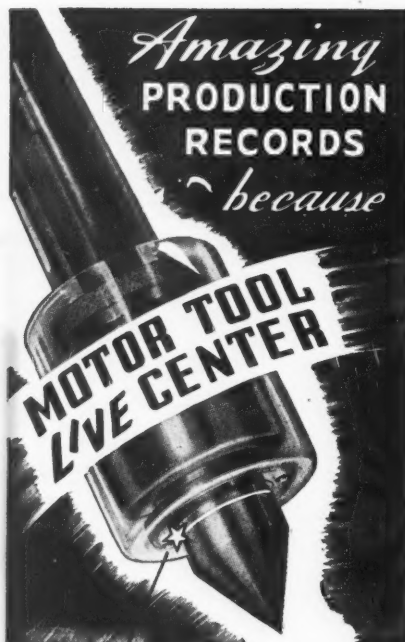
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or slitting cutter. If the saw is $\frac{1}{8}$ -inch thick, a cut through 2 x 4 inches or 8 square inches of stock removes one cubic inch of metal. With method number two, a cut through 2 x 6 inches or 12 square inches of stock removes $1\frac{1}{2}$ cubic inches of metal. With the third method, the saw must cut through 4 x 6 inches or 24 square inches of stock, removing 3 cubic inches of metal.

The above $\frac{1}{8}$ -inch thickness of the saw is only hypothetical. A band saw $\frac{1}{4}$ inch or less in thickness might be used; however, the metal removed and time consumed is proportional.

The specifier must know, of course, under what conditions the steel is manufactured—whether it is bright finished, cold rolled or cold drawn, or whether it has rough, hot rolled surfaces. Cold drawn steel is produced to comparatively close tolerances and with smooth finishes, so that in most instances a surface grinding operation brings the material to the required size without milling, shaper, or planer cuts. On the other hand, high carbon or other high alloy steel many times is shipped in a blackened, rough, scaley, or rusty condition. In such cases, it is well to assume that a cut $\frac{1}{8}$ inch in thickness must be taken on each of the four surfaces to clean up the stock. The longer the pieces, the greater the allowed depth of cut must be in order to obtain proper surface finish.

If, by coincidence, all three sizes appear in the steel stock list, certainly two could be eliminated unless this stock is to be used for longer pieces than called for in the example. If used for only one particular setup, method number one should be chosen. When cutting off the stock, if the cut is accurate and parallel, only enough additional metal need be allowed for length to finish by a grinding operation.

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**Let's get smart -
and check the chart!**



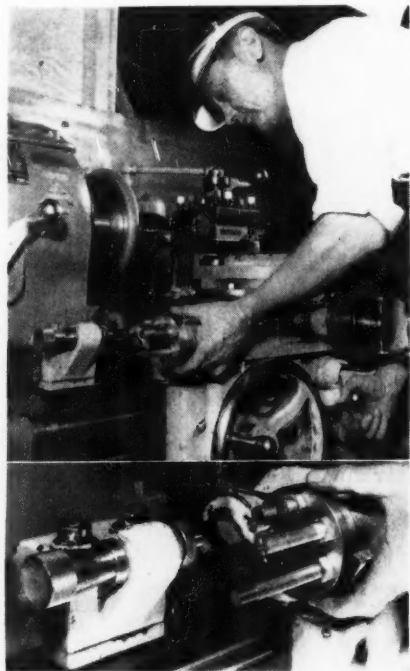
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Adjustable Lathe Stops

By GILBERT C. CLOSE

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This illustration shows an adjustable lathe stop devised at Northrop Aircraft to save time on jobs requiring multiple lathe return settings.

on jobs requiring multiple lathe return settings. Suggested by the types of stops used on turret lathes, these adjustable stops have been applied to practically all engine lathes at Northrop and have resulted in appreciable time-saving and cost reduction. The stops were tooled and fabricated in the company's own tooling department.

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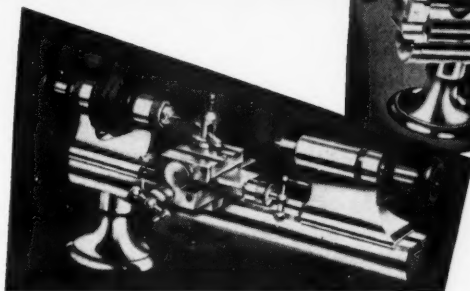
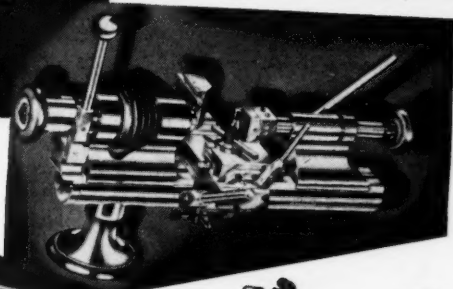
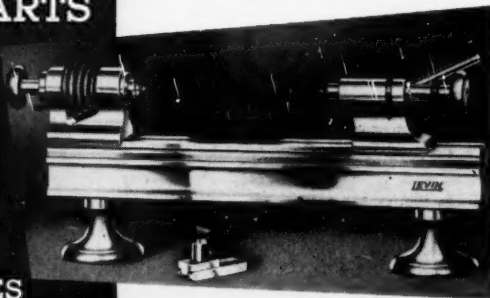
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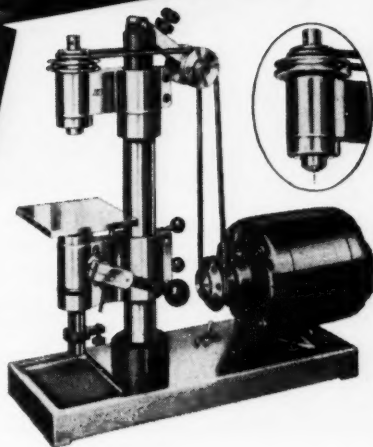
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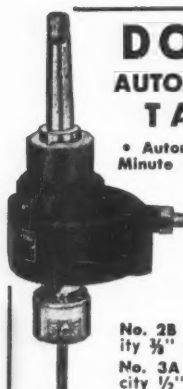
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Practical Design for Section Die Sub-Plate

By CLIFF BOSSMANN

FIG. 1 shows die block assembly consisting of four die sections, identified as A, B, C, and D, mounted in a sub-plate, E. Sectional die blocks are usually made for rather complicated blank outlines and, when sec-

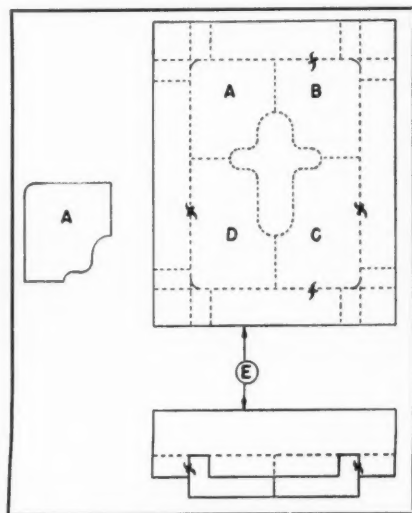


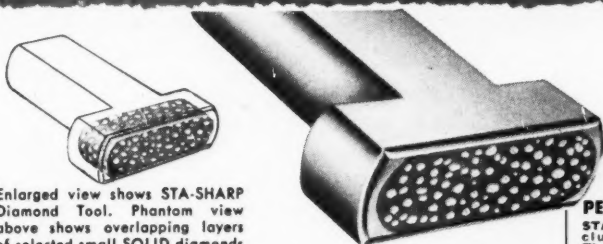
Fig. 1—Sketch of sectional die block

tions of this design are used, the finished sides of the sub-plate must be accurately and smoothly finished to provide square locating surfaces for the ground edges of the die sections.

The usual procedure for adapting the sub-plate to accommodate the die sections is to end mill a square shaped cavity in the plate. However, such a cavity does not permit the use of a grinding wheel for finishing the sides of the cavity to provide smooth and accurate surfaces. The writer has found that by milling a slot all the

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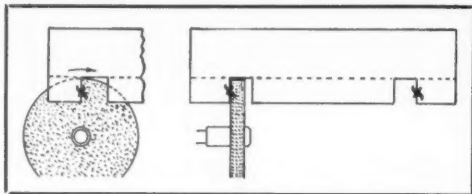


Fig. 2—Sketch showing how slots machined all the way across the sub-plate, both left to right and front to back, enable a grinding wheel to be used in finish grinding the sides of the cavity

way across the sub-plate, left to right and front to back as shown in Fig. 1, a grinding wheel can be used to readily finish grind the sides of the cavity. The grinding wheel rotates in the slot in a manner as shown in Fig. 2 and allows for finish grinding the sides of the cavity to any desired dimension.

Drill Block Facilitates Drilling and Reaming of Bolt Holes

By IRA S. ROBERTS

A SIMPLE drill block designed by Loyd D. Cain, an assistant foreman

at the Texas Engineering and Manufacturing Co., Inc., Dallas, Tex., is saving approximately three man-hours per unit on Boeing B-47 rear fuselage sections being manufactured by Temco. Mr. Cain's suggestion, submitted through the Temco suggestion system, was designed to simplify the drilling and reaming of holes for the bolts used to attach the fin stub chord angles to the main fuselage forging. When this operation was performed without a fixture, it was difficult to keep the holes straight or make the bolt heads seat properly, and considerable rework was required. The new block, which serves as a drill jig

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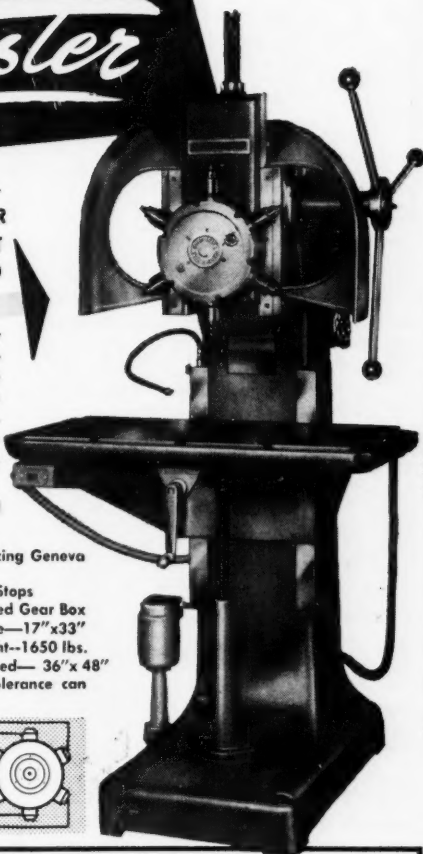
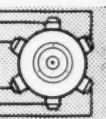
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Drilling
Reaming
Tapping

Threading
Counter Boring
Spot Facing

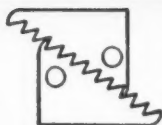


Write today for
detailed information.

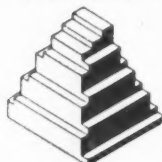
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Magnetic Blocks and Parallels



T-Slot Bolts

**Step Set-Up Blocks
Steel—Maple**



Pyramid Set-Up Blocks



Also Hand Wheels, Machine Handles, Levers, Cranks, Plastic Balls, Cast Iron Knobs, Machine Vises.

Write for Catalog and Prices on Complete Reid Line

REID TOOL SUPPLY CO.

709 BAKER ST.

MUSKOGEE HTS., MICH.



This illustration shows how a simple drill block designed by Temco assistant foreman facilitates drilling and reaming of bolt holes in aircraft fin stub chord angles.

ALL in ONE TOOLHEAD



**SIX SIZES
AVAILABLE**

**All Have Power Feed
for Facing**

**Write today for
complete details.**

CHANDLER TOOL CO.
Muncie, Indiana

**BORING
FACING
TURNING
GROOVING
UNDER-
CUTTING**



Model "D"

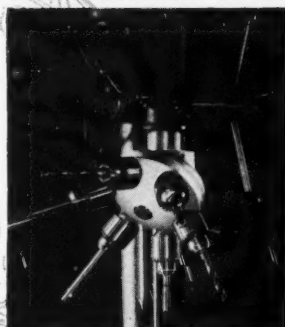
Chandler-Duplex

on one end for drilling $\frac{1}{8}$ -inch holes and as a fixture on the other end for reaming these holes to $\frac{1}{2}$ inch, has eliminated this rework completely.



LIGN-O-MATIC

REDUCES HANDLING TIME



**for all
consecutive
drilling
operations**

PROVEN PRODUCTION INCREASES with consistent precision . . . are obtained by adding a Lign-o-matic to any standard drilling machine. Turret indexes faster than tools can be changed or work moved to next spindle. Keeps your men drilling instead of moving work or changing tools. Frees machines for other work. And remember, this is the *only* drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.

VERSATILITY — Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines) up to ½ inch diameter on any material. Mating tapers and self-centering bearings assure perfect alignment with drill press spindle while minimizing wear throughout long, hard use.

MONEY BACK GUARANTEE — Try it at our expense. If you are not completely satisfied for *any* reason, return turret within 10 days and pay nothing! Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper . . . \$235.00.

DELIVERY — Currently, 2 weeks.

☐ Please rush Lign-o-matic turrets for (drill press make)
(size) (quill dia.) (spindle taper)

My name

Title

☐ Please send literature on Lign-o-matic turret. (Attach coupon to company letterhead)

HOWE & FANT, INC.

536 FLAXHILL ROAD
SO. NORWALK, CONN.

News

New Administration Building Under Construction by Lodge & Shipley

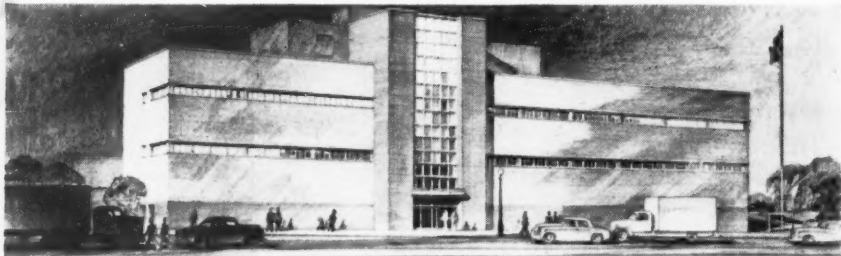
Ground was recently broken for a new administration building by William L. Dolle, president of The Lodge & Shipley Co., Cincinnati, Ohio. Besides centralizing office and administrative departments, the new building will release 14,000 square feet of plant area vitally needed for heavy manufacturing expansion. Lodge & Shipley officials expect that the building will be completed and occupied in late summer of 1952.

Housed in the new building will be administrative personnel and facilities, the engineering staff, tool design, time study, methods and standards and other departments which have been

located in various sections of the present plant. The new building is to be three stories high with an additional section on the roof. Length of the structure will be 251 feet, fronting on Colerain Avenue. With a depth of 40½ feet, 33,000 square feet of additional floor space will be provided. Construction plans specify a reinforced concrete frame and masonry walls with limestone copings. Exterior walls are to be of warm grey brick in two tones. Dark brick will be used at the base of the building and on the entrance wing; upper walls will be light toned brick. The front of the entrance wing, housing the lobby, will be structural glass extending to the top of the building.

The ground floor will accommodate employee's cafeteria, personnel of-

Wash drawing of new administration building now being constructed by The Lodge & Shipley Co., Cincinnati, Ohio



OF THE INDUSTRY

fices and medical facilities. Engineering and shop offices will be on the first floor. Executive offices will be located on the second floor and in the third floor section. A feature of the design is the use of long, narrow windows with sills 4½ feet from the floor to permit maximum flexibility in arrangement of furniture and equipment and still afford ample light. Air conditioning, fluorescent lighting, acoustical ceiling and asphalt tile flooring will be used throughout. An automatic passenger elevator will serve all floors.

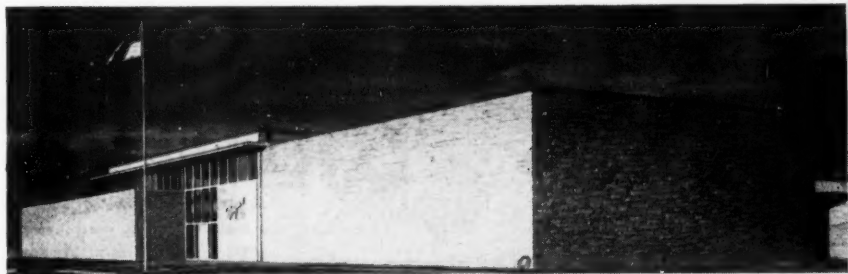
C. A. Norgren Company Shows New Plant

The new home of the C. A. Norgren Co., Englewood (suburb of Denver), Colorado, was formally opened to

public inspection late in February. The new and unusually attractive building was shown at three open houses on February 24, 25, and 26 for employees' families, for business and civic leaders in the area, for customers and suppliers, and for the general public. Nearly two thousand visitors attended these open houses.

Behind its beautifully designed and constructed front elevation of red boulder sandstone and non-reflecting, polished plate glass is a plant area of more than 2½ times the old structure. Total area of the new building is more than 60,000 square feet. The production sector is laid out on a flow plan and integrates two complete manufacturing divisions — machining and assembly. Each division has its own stockroom — raw materials stock for the

New plant of C. A. Norgren Co., Englewood, Colorado



machine shop and finished parts stock for the assembly division.

Another special point of interest is the spacious and attractive employees lunchroom and auditorium. The location of the plant, adjoining Englewood City Park, makes available to Norgren employees such recreational facilities as a baseball diamond, swimming pool, golf course and driving range, and picnic grounds.

Nationwide Laboratory Inspection Service

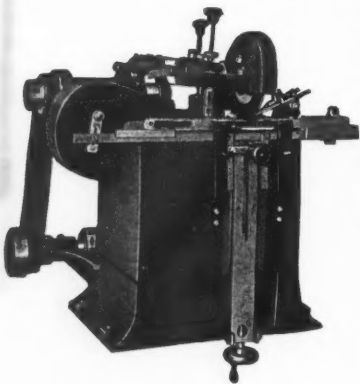
To better furnish job-by-job inspection where it is needed, Magaflux Corp., 5900 Northwest Highway, Chicago 31, Ill., has increased the national coverage of its commercial laboratories from five to eleven locations. Folders are now available to briefly cover the two phases of this available

inspection: (1) Laboratory Inspection of parts from one to 1,000,000 and (2) Field Inspection for large objects.

This inspection service is an addition to the regular manufacture and outright sale of inspection equipment by Magnaflux Corporation, and is said to be increasingly pertinent since inspection with these various testing methods is widely specified in government contracts and in large-company sub-contracts for components for aircraft, engines, guns, tanks, trucks, radar, ships, and other defense equipment.

Inspection laboratories are located in Chicago, Ill.; New York, N. Y.; Hartford, Conn.; Cleveland, Ohio; Detroit, Mich.; Wichita, Kan.; Dallas, Texas; Houston, Texas; Odessa, Texas; Los Angeles, Calif.; and Oakland, Calif. Full addresses and information are contained in the Laboratory and Field Inspection folders, respectively.

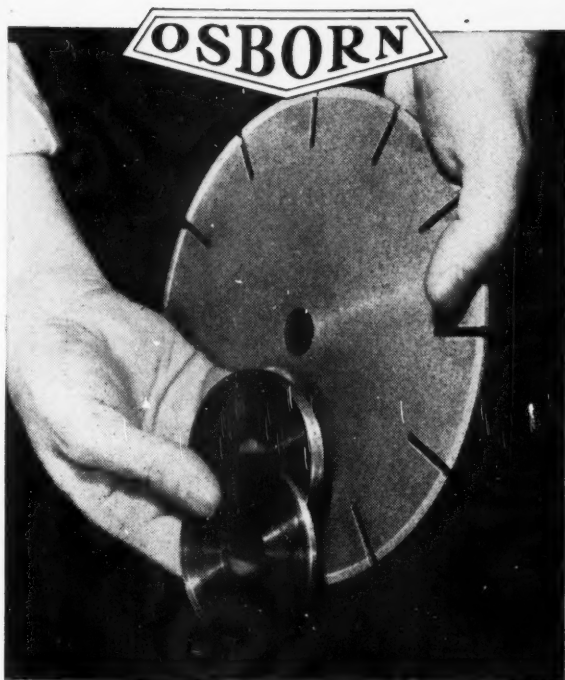
HERE'S THE SHARPENER THAT TRIPLES YOUR SAW MILEAGE



If you are sharpening saws with other means, you may be throwing several hundred dollars out the window every year. Tests have proven the EC Combination Circular, Hack and Band Saw Grinder repays its cost in the savings made possible by a single gross of high speed steel blades resharpened with EC Grinder. Takes five or six sharpenings instead of one or two. The EC is a precision sharpener, and is the only grinder that does not depend on the shape of the grinding wheel to form the shape of the tooth. Grinds a variety of blades without dressing or changing wheel.

Write for Bulletin on EC Metal Cutting, Circular, Hack and Band Saw Grinder. Wardwell Mfg. Company, 3166 Fulton Rd., Cleveland 9, Ohio.

 **WARDWELL**
Maker of largest line of
saw and tool sharpening machines



Diamond-saving idea makes them do 80% more work!

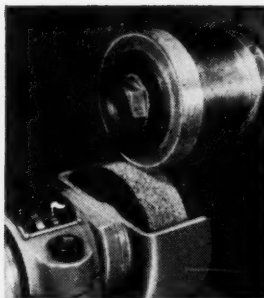
Longer life and faster production from critically scarce industrial diamonds are being obtained by this method of dressing diamond wheels:

When wheels become grooved and out of square, true them by grinding, two at a time. After truing, mount wheels together in grinder and dress with counter-rotating 8-inch Osborn wire brush. This brushing removes some brass matrix, exposing the diamonds. One plant reports that this increases the wheel's cutting action 80%.

This is typical of many production aids available through your Osborn Brushing Analyst. Call him today or write *The Osborn Manufacturing Company, Dept. 685, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes 

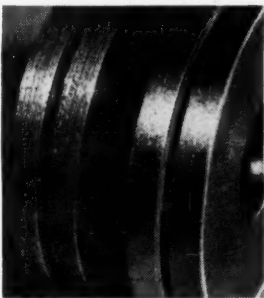
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



TRUE THE SURFACE. With this set-up true two diamond wheels at a time. Surfaces become uniform and perfectly flat. Usually takes about 15 to 30 minutes.



BRUSH THE MATRIX. Rotate the two wheels counter to rotation of Osborn wire wheel brush. This dressing removes some of the brass matrix. Leaves the diamonds exposed.



SEE THE DIFFERENCE. Two wheels on left show grooves before truing. Surface is arched. Two wheels on right have been trued and dressed. Dressing increased cutting action 80%.



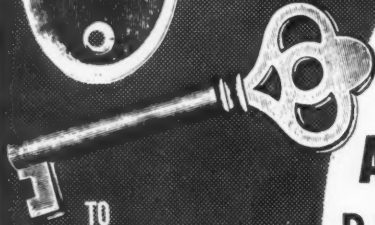
New plant of Falcon Tool Co., Detroit 34, Michigan

Falcon Tool Company in New Home

The Falcon Tool Company, established over 16 years ago by Ralph A. Edens, is now occupying a new modern plant located at 20771 Ryan Rd. (just north of Eight Mile Rd.), Detroit 34, Mich. Many new items of convenience and comfort have been installed for

efficiency, as well as maximum production.

In addition to a complete line of standard metal cutting tools, a newly developed T. I. Drive which is quickly interchangeable on all types of screw machine tools, reamers, counterbores, and so on, is now being manufactured by the company.



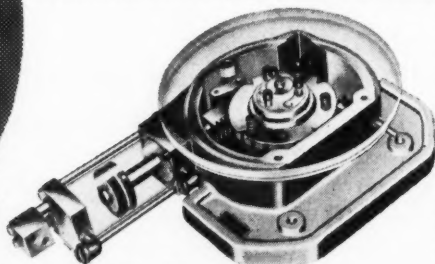
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INCREASED PRODUCTION

LOWER COSTS

GREATER DEPENDABILITY



ALLEN AIR OPERATED DIAL FEED TABLES

MODEL 11EA and 11EB

- Working Mechanism Completely Enclosed
- Rack and Gear Drive

Please Write for Illustrated Brochure.

- Clockwise or Counterclockwise Rotation
- Adjustable from 4 to 24 index
- Guaranteed Against "Over-ride"
- All Working Parts Flame Hardened

THE A. K. ALLEN CO.

57 MESEROLE AVE.

AGENTS IN PRINCIPAL CITIES
BROOKLYN 22, N. Y.

Try an **AVEY** once . . .
AND YOU'LL NEVER CHANGE

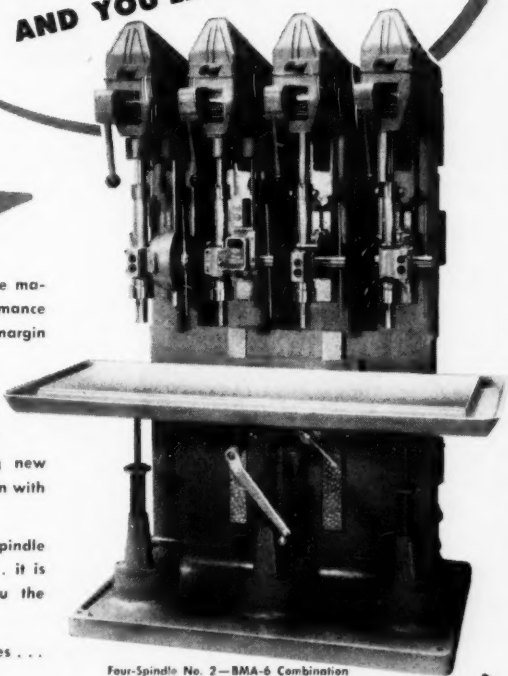
You'll be convinced beyond doubt it is the machine you need for uninterrupted performance and increased production with a wider margin of profit.

Our first-time customers become Avey-minded because the Avey High-Speed, Sensitive and Upright Drilling and Tapping Machines do the job faster . . . setting new records for cost cutting and mass production with minimum of maintenance.

You'll be proud to own an Avey Four-Spindle No. 2—BMA-6 Combination Machine . . . it is engineered and time-tested to give you the most for your dollar.

Yes . . . Avey's records speak for themselves . . . and men-in-the-know are listening!

Even your unusual problem will become routine if you use the services of Avey engineering.



Four-Spindle No. 2—BMA-6 Combination Machine. Built in No. 2 and No. 3 sizes.

Consult the yellow pages in your phone book —under Machine Tools—for our nearest representative, or write direct to our factory.

THE *Avey* DRILLING MACHINE CO.
Cincinnati 1, Ohio

Bearing Maintenance Reports Again Available

The Anti-Friction Bearing Distributors Association, 1900 Euclid Ave., Cleveland 15, Ohio, has announced that the "AFBDA Bearing Maintenance Report" published at regular intervals during the past year by the Association

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SPIRAL
WORM
BEVEL
GEARS**
 GENERATED WITH
PRECISION ON
MODERN EQUIPMENT

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SAMPLES OR
BLUEPRINTS
FOR
QUOTATION

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THAT
DO A BIG JOB

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SOLID!
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LONG LIFE!
STRENGTH!



WE SPECIALIZE IN SMALL SIZES!

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4811 LENNOX BLVD. INGLEWOOD, CALIF.

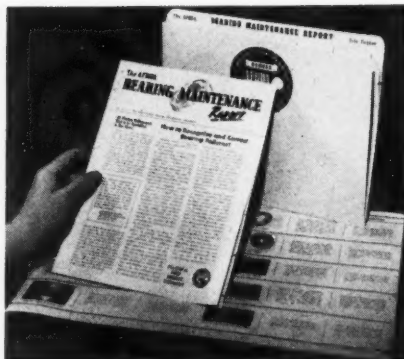


Illustration showing type of bearing maintenance data being made available to bearing users by The Anti-Friction Bearing Distributors Association

is again being offered without charge during 1952 to men within industry as a service of the AFBDA and its members. The purpose of these reports is to provide a single handy reference source that will afford ready answers to the many questions arising on current problems of maintenance, and to announce the latest developments in new bearings and bearing applications and any current improvements in the techniques of removal and reinstallation. A file folder type of binder in which succeeding issues of the report can be compiled is sent to each bearing user receiving regular copies of the report.

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JIG
 BORING

CAM
 MILLING
 A SPECIALIZED CAM
 MILLING SERVICE...
 JIG BORING... SPOT
 WELDING... CON-
 TRACT PRODUCTION
 ...EXPERIMENTAL DEVELOPMENT





EISLER ENGINEERING CO., Inc.
 734 So. 13th St. Newark 3, N. J.



Time Savings up to **50%** IN ABRASIVE FINISHING!



Here's a time-saving tip well worth your taking!

You know the cleaning, cushioning and polishing advantages of rubber. You know the finishing actions of abrasives. Why not use advantages of both in Brightboy—the same as many firms working lightweight and semi-precious metals, plastics, laminated materials, wood and glass are now doing—to combine burring, finishing, cleaning and polishing in



WHEELS, STICKS,
RODS, BLOCKS
for machine and
manual operations

HAVE YOU A DEFENSE CONTRACT? Investigate the wide adaptability of Brightboy, already proved in the manufacture and maintenance of Ordnance, Internal Combustion and Jet Engines, Airplane Parts, Electrical and Electronic Equipment, Transportation Equipment—and for the production of basic tools, dies, molds, jigs, patterns, etc.

one time saving operation? Investigate Brightboy's versatility for a wide range of applications far beyond the scope of conventional abrasives. Brightboy users are saving up to 50% on finishing time over methods and materials previously used—and achieving unusual as well as conventional surfacing effects.

BRIGHTBOY SAVES PRODUCTION AND MAINTENANCE TIME

Bridges the gap between the rough grind and the buff; takes up where coarse abrasives leave off; works to close tolerances; can be shaped to contour. Produces a wide variety of conventional and special finishes and patterns; frequently the final polish. Requires no before-use preparation or dressing; no skilled labor to handle it.

A FEW OF MANY GENERAL USES

Removing light digs, tool and heat marks. Cleaning welded and soldered joints • Finishing dies and molds • Burring stampings, castings, machined parts • Maintaining tools, production and plant equipment.

Ask your dealer for the informative Brightboy Catalog Manual outlining uses and adaptations. Write the Brightboy Service Department on any problem where finishing is involved.



**BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.**

6th Ave. & No. 13th Street Newark 7, N. J.

America's Pioneer Manufacturer of
Rubber-Bonded Abrasives

New AOA Committee Serves as Advisor for Shell Producers on Carbide Tooling Information

The American Ordnance Association now has in full operation a carbide cutting tool sub-committee of its Shell Committee. Representing all manufacturers of tungsten carbide cutting

tools, the committee serves as advisor on carbide problems arising in shell manufacturing.

All available technical data on application of carbides in shell manufacture has been assembled and a list is available to shell producers. Shell Producers are being advised of additional bulletins as rapidly as they are prepared by individual carbides producers. Assistance is also being provided to shell producers by the carbide committee on the organizing of training programs relating to the application of carbides in shell production.

Chairman of the committee is J. S. Gillespie, Carbology Department, General Electric Company, Detroit. Membership includes P. E. Floyd, Allegheny Ludlum Steel Corp.; M. E. Backstrom, Firth Sterling Steel & Carbide Corp.; Bennett Burgoon, Kennametal, Inc.; R. T. Beeghly, Metal Carbides Corp.; H. W. Highriter, Vascoloy-Ramet Corp.; and W. N. Howley, chairman, AOA Shell Committee. Information as to available carbide tooling data or training programs should be addressed to J. S. Gillespie, Chairman, Carbide Cutting Tool Sub-Committee, American Ordnance Association Shell Committee, c/o Carbology Department of General Electric Company, Box 237, Detroit 32, Michigan.



**T-NUTS
STUD SETS
STRAP CLAMPS**

SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.
ENGLEWOOD, OHIO

**HAND TAPPING
with
MACHINE
PRECISION**

Adapts for
LATHE USE

59⁵⁰
F. O. B.
ST. PAUL



Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the rail stock center of a lathe. Size 13" x 8" x 14". Included 9 adaptors (8/32 to 3/4"). Taps not furnished. Dahlstrom Mfg. Co., 2522 W. Larpenteur, St. Paul 8, Minn. Write for Pamphlet—Also Shows Chucks & Autostops.

Dahlstrom TAP GUIDE

Get a NU-THRED!

The Fast Cutting Thread File

Use Nu-Thred Like a File to Repair
Damaged or Battered Threads on
Bolts, Studs or Axes. Fast!

\$2.50 Each, Post
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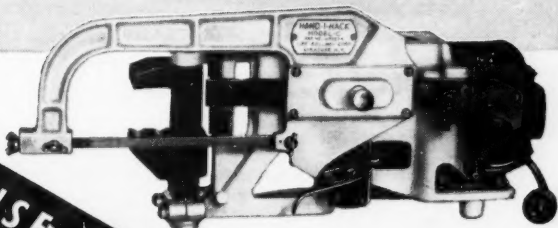
8
THREADS ON
EACH FILE

No. 1 For 11, 12, 13, 14
No. 2 For 9, 10, 12, 16
16, 20 and 24 20, 27, 28 and 32
DEALER INQUIRIES INVITED

Order a Pair Today From
BOX N213 KROME, Inc. READING PENNA.



STOP HACK SAWING DRUDGERY!



USE
HAND-I-HACK*

**ONE HAND
CARRIES IT**



The only
**TRULY PORTABLE
Hack Saw Machine.**

Hand-I-Hack is the first genuinely portable hacksaw machine. You can take it *to the work*. It will cut in *any* position. Save elbow grease—the

most costly power known.

Simply clamp your work in the HAND-I-HACK swivel vice . . . set blade . . . start motor. HAND-I-HACK does the rest. Shuts off automatically when cut is finished.

HAND-I-HACK can do 95% of all sawing jobs usually done by hand. Uses low-cost 10" hand blades which last 3 to 5 times longer . . . because HAND-I-HACK operates on draw cut and lift return principle. Capacity 3" x 3".

WRITE TODAY for full information, and name of nearest dealer.

*Trade Mark Reg. U. S. Pat. Off.



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Manufacturers of Automotive Clutches and Machine Tools
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**POCKET-SIZE
COMPARATOR TESTER**



A compact, low cost precision tester which will fill a dozen needs in your plant.

Easily carried anywhere and used on-the-job by anyone.

Gives accurate surface elasticity readings, easily converted to Rockwell or Brinnell.

Hundreds in daily use in all types of industry. A trial tester will prove its value.

PRICE \$25.50 Plus Tax
Including case

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MILLING CUTTERS**



- **SQUARE BLADES**
Easily Replaced.
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Blade Adjustment.
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- **Cutters from 1½"**
to 14" dia.

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END MILL**

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W. T. HOWALD
MACHINE WORKS
182 SIGOURNEY ST., BROOKLYN 31, N. Y.

Clinton F. Robinson Elected President of Carborundum Company

The board of directors of The Carborundum Co., Niagara Falls, N. Y., has elected Clinton F. Robinson as president and director of the company to succeed H. K. Clark, who re-



(Upper left) Clinton F. Robinson, (upper right) Paul B. Brown, (lower left) Clarence E. Hawke, and (lower right) William H. Wendel

signed as president. Mr. Clark will continue with the company as a member of the board of directors. Messrs. Paul B. Brown, Clarence E. Hawke, and William H. Wendel, formerly managers of the Bonded Products and Grain Division, Refractories Division, and Coated Products Division respectively, have been elected vice presidents in charge of their divisions.

Mr. Robinson, 49 years of age, has a distinguished record in both the military and industrial field. Graduating

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**Hassall
decimal-
equivalent
wall chart**

Fraction	Decimal Equivalent
1/32	.0156
1/16	.0625
3/32	.0937
1/8	.1250
5/32	.1562
3/16	.1875
7/32	.2187
1/4	.2500
9/32	.2812
5/16	.3125
11/32	.3437
3/8	.3750
13/32	.4062
7/16	.4375
15/32	.4687
1/2	.5000
1/32	.0312
1/16	.0469
3/32	.0781
1/8	.1094
5/32	.1406
3/16	.1719
7/32	.2031
1/4	.2344
9/32	.2656
5/16	.2969
11/32	.3281
3/8	.3594
13/32	.3906
7/16	.4219
15/32	.4531
1/2	.4844
1/32	.5156
1/16	.5312
3/32	.5469
1/8	.5625
5/32	.5781
3/16	.5937
7/32	.6094
1/4	.6250
9/32	.6406
5/16	.6562
11/32	.6719
3/8	.6875
13/32	.7031
7/16	.7187
15/32	.7344
1/2	.7500
1/32	.7656
1/16	.7812
3/32	.7969
1/8	.8125
5/32	.8281
3/16	.8437
7/32	.8594
1/4	.8750
9/32	.8906
5/16	.9062
11/32	.9219
3/8	.9375
13/32	.9531
7/16	.9687
15/32	.9844
1/2	1.0000

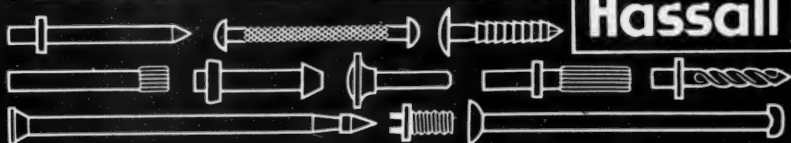
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In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source of cold-headed parts.

JOHN HASSALL, INC.

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ESTABLISHED 1850



from West Point in 1924, later acquiring an engineering degree at Cornell, he was successively promoted from 1st Lt., Corps of Engineers to Major General in 1944, retiring as Major General in 1948. Mr. Robinson's extensive experience in the industrial world includes: former president of Frederic B. Harris Company of New York City; presently director and member of the executive committee of Fansteel Met-

allurgical Corp., Chicago, Ill.; director and member of the executive committee of R. P. Bennett Co., Frederick, Md.; and director of American Metallic Corp., Portland, Oregon.

Paul B. Brown, vice president in charge of the Bonded Products and Grain Division of Carborundum, came to the company in 1948 as manager of that division. A graduate of M. I. T., he was formerly with the Norton Com-

pany as assistant manager of foreign sales and for two years general manager of Australian Abrasives.

William H. Wendel, vice president in charge of the Coated Products Division, has an engineering degree from U. S. Naval Academy at Annapolis and masters degree from Harvard School of Business Administration. After active service as an airship pilot, Mr. Wendel was a staff assistant for the War Production Board. In 1946 he left the Navy to accept a position as assistant to the president of U. S. Engineering Company. He joined Car-

MORE THAN A "COOLANT" IS NEEDED

"COOLANT" is a misnomer as applied to *cutting fluids*. You won't get far with just a coolant. The fluid used for metal cutting must have multiple characteristics in order to provide the desired finish and tool life at the required production rate:

- **Cooling Action**—necessary to carry away the heat generated by machining, but only part of the function.
- **Lubricity**—to reduce friction between the tool and the work piece.
- **Anti-Weld Properties**—to prevent build-up of metal on the tool and scuffing of the work piece.

These factors and others are all inter-related. Over-simplification of the subject and the cutting fluid can lead to trouble.

Let a Stuart sales-engineer show you what can be accomplished with the *right* cutting fluid. Ask for *Bulletins*.



D. A. Stuart Oil Co.
EST. 1905 LIMITED

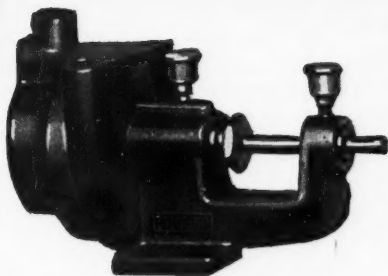
2741-47 S. Troy Street, Chicago 23, Ill.

• COOL TOOLS WORK BETTER, LONGER

COOL TOOLS BEST WITH



CENTRIFUGAL COOLANT PUMPS



MODEL PR54

Right rotation

MODEL PLS4

Left rotation

Direct connection;
1800 to 2600 rpm;
3 1/2 to 5 gal. per min.

Pipe sizes: 3/8" to 1 1/2"

HERE'S WHY FULFLO PUMPS BELONG ON YOUR EQUIPMENT:

- constant pumping action • chips or grit do not interfere
- spring tension packing prevents leaks • no bearing in pump to wear out • pump shaft replaced easily • carbon seal, if desired • automatic adjustment
- right or left rotation
- self-contained priming chamber

Direct or motor drive

Capacities: 1/4 hp 25 gpm to
1 hp 90 gpm

Send for Your professional copy
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FULFLO MECHANICAL DATA BOOK



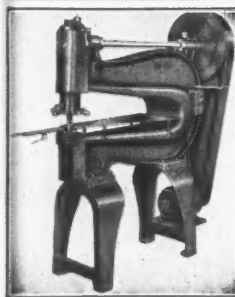
THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

borundum as staff assistant to the president in 1947 and subsequently was made manager of the division.

Clarence E. Hawke, vice president in charge of the Refractories Division at Perth Amboy, New Jersey, and son of the late Martin Hawke who pioneered as managing director of The Carborundum Company, Ltd., Manchester, England, has held many important posts in Carborundum, including assis-

tant to the works manager and later superintendent of Deutsche Carborundum Werke, Dusseldorf, Germany; sales manager of the Refractories Division; director of sales; and manager of the Refractories Division prior to his present position as Vice President.

SAVAGE NIBBLING MACHINES



CAPACITY
 $\frac{3}{4}$ " MILD
STEEL

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ASK FOR
FREE BULLETIN
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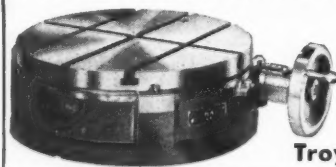
"NIBBLE YOUR COSTS"
FOR TUBE SLOTTING, TUBE SHAPING
AND CUTTING FLAT SHEETS BY
TEMPLATE OR TO A SCRIBED LINE.

W. J. SAVAGE COMPANY
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NO MORE COSTLY JIGS

on small production jobs with
TROYKE WORM WHEEL OPERATED TABLES

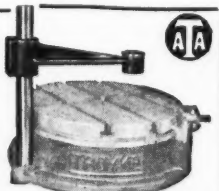


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RECONDITIONING TO NEW-TOOL PERFORMANCE AT A FRACTION OF NEW TOOL COST!

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Why take less?-- for Safety, Efficiency, Economy--
insist on genuine factory reconditioning service performed
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CONSERVE CARBIDE TOOLING



THIS BEFORE AND AFTER PICTURE SHOWS WHAT OUR NEW-TOOL CRAFTSMEN CAN ACTUALLY DO WITH YOUR BATTERED CARBIDE TOOLS OF THIS AND SIMILAR TYPES

CONSERVE THROUGH REGRINDING



REPRESENTS
A NEW
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MIDGET MILL
(HIGH SPEED OR CARBIDE)



REPRESENTS
THE SAME TOOL
AFTER 20 REGRINDS

YOUR DULL CUTTERS ARE REGROUND BY
SEVERANCE NEW-TOOL CRAFTSMEN

CONSERVE THROUGH SALVAGE



YOUR DULL
ROTARY
FILES
can be
ground into



MIDGET MILL
TYPE TOOLS
LIKE THIS

ELIMINATES LONG
DELIVERY WORRIES--
Saves Your Dollars!

☆☆☆ *We're the Originators* ☆☆☆
OVER 20 YEARS EXPERIENCE IN THIS MONEY SAVING SERVICE

☆ *We've been copied but not surpassed* ☆

DEPENDABLE DELIVERIES ARE ASSURED ☆ THROUGH SEVERANCE REGRINDING SERVICE
We Regrind: MIDGET MILLS, ROTARY FILES, BURS, FILE BANDS, COUNTERBORES, COUNTERSINKS, ETC.

SEND YOUR DULL CUTTERS TO

SEVERANCE TOOL INDUSTRIES, INC.

724 IOWA AVENUE

In Canada: 60 Front St., W., Toronto

SAGINAW, MICH.



Expanded plant of Federal Tool & Mfg. Co., Minneapolis, Minnesota

Federal Tool Completes New Plant Addition

The completion of a new addition to the Federal Tool and Manufacturing Company plant at Minneapolis, Minnesota, has been announced by E. J. Skramstad, president. The new addition, which is of brick, concrete block, and steel construction, adds 12,000 square feet to the plant. Most of this space will be devoted to an expanded die department. The space formerly oc-

cupied by the die department will be used for production and for additional production equipment which is now being installed.

Earlier this year another addition was built onto the plant which is used entirely for material storage. These two additions more than double the capacity of the company which specializes in short-run stampings from metal, phenolics, and various other materials.

*for greater RIGIDITY
more ACCURATE cuts*



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WORKS

**BORING
HEADS**

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ¾" to 1¾" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

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have not yet heard the good news:**

...LOCKHEED IN CALIFORNIA HAS RAISED ENGINEERS' SALARIES

Lockheed Aircraft Corporation has raised engineers' salaries recently, in recognition of the importance and excellence of their work on both military and commercial aircraft.

The substantial increases make Lockheed engineers among the highest paid in the aircraft industry.

Engineers who join the Lockheed staff receive the benefits of these pay boosts.

In addition to increased salaries, Lockheed also offers engineers:

1. A "bonus" every day in better living—just because you live in Southern California, in an area where the climate is beyond compare.
2. A future that offers both security and advancement, helping create planes for defense, planes for the world's airlines in Lockheed's long-range development program.
3. Better personal working condi-

tions among men who have built a reputation for leadership in aviation.

Lockheed also offers these extra benefits:

Generous Travel allowances • Outstanding Retirement Plan • Vacations with pay • Low cost group life, health, accident insurance • Sick Leave with pay • Credit Union, for savings and low-cost financing • Employees' Recreation Clubs • Regular performance reviews, to give you every opportunity for promotion • On-the-job training or special courses of instruction when needed.

Send today for illustrated brochure describing life and work at Lockheed in Southern California. Use this handy coupon.

ENGINEER TRAINING PROGRAM

Mr. M. V. Mattson, Employment Mgr. Dept. MMS-4

LOCKHEED AIRCRAFT CORPORATION

Burbank, California

Dear Sir: Please send me your brochure describing life and work at Lockheed.

My Name _____

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Steel Sales Company to Hold Three-Day Welding Clinics

The Steel Sales Corp., 3348 S. Pulaszki Rd., Chicago 23, Ill., has announced that three-day welding clinics will be held in each of its newly completed warehouses in Milwaukee and Minneapolis. The Milwaukee clinic, to be held in the company's Wisconsin warehouse located at 2400 W. Cornell St., Milwaukee, will begin on Wednesday, April 16 and will continue through Friday, April 18. The Minneapolis clinic, to be held in the Minnesota warehouse at 401 Harding St., N. E., Minneapolis, will begin on Wednesday, April 23 and continue through Friday, April 25.

Daily demonstrations of electric arc, oxyacetylene, and heliarc welding and aluminum, bronze, and silver brazing will be conducted by representatives of the following nationally known concerns having booths at the

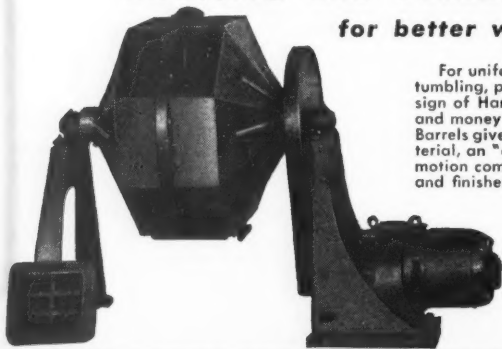
clinic: The International Nickel Company, Inc., Aluminum Company of America, Revere Copper and Brass, Crucible Steel Company of America, Allis-Chalmers, National Cylinder Gas Company, and several others. A variety of metals will be used in the demonstrations of the various welding and brazing processes. Brass, copper steel, cast iron, Monel, Inconel, nickel, and clad steel will be extensively treated.

Visitors are urged to bring specific welding and brazing problems and questions to the clinic. Experienced technical representatives of the above firms will be on hand throughout the three-day period of the clinic to assist in solving specialized problems. In addition, interesting motion pictures and a variety of manufactures' literature will be available. Open forum discussions and question-and-answer

HARTFORD TRIPLE ACTION

CUTTING and TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

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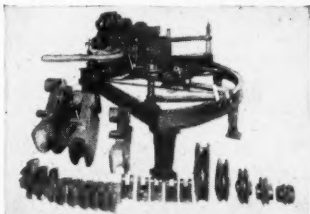
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American "

LINE OF COLD PIPE,
CONDUIT AND HEAVY
WALL TUBE BENDERS
HAND AND POWER

ONE OF 10 HAND-OPERATED TYPES
bending cold pipe from 1/4"
to 6" I.P.S. inclusive

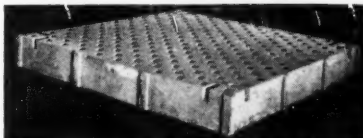


MOTOR-POWERED TYPE E AND F
5 and 7 1/2 h.p. — Bend up to
90° without a mandrel. Motor-
Operated capacities 2 1/2" to
6" inclusive.

AMERICAN PIPE BENDING MACHINE CO., INC., 14 Furnace Street, Poultney, Vermont



Up to 2" —
Type A30



COMBINATION BENDING TABLES

For hot or cold bends of various
shapes, pipes, bars, etc. 5' sq.; 7' sq.
(3 1/2' x 7' pairs) suitable for welding
together. Other sizes or custom made
to your specifications.

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METAL CUTTING MACHINES

FAST METAL CUTTING
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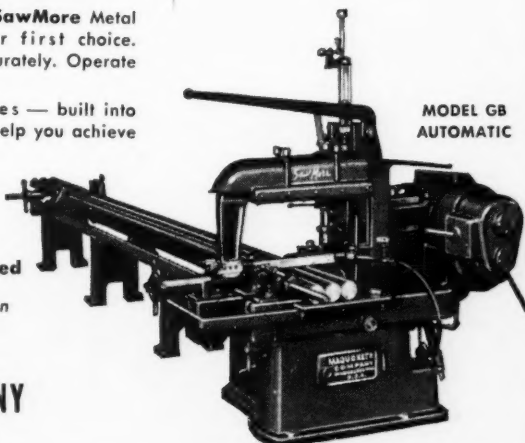
If it's speed you need . . . **SawMore** Metal
Cutting Machines are your first choice.
SawMore Machines cut accurately. Operate
at lowest cost.

These highlight features — built into
every **SawMore** Machine—help you achieve
top production.

- Self-aligning blades
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MODEL GB
AUTOMATIC

panels conducted by expert welding and brazing technicians will be held each day to introduce new methods and to acquaint visitors with the latest procedures in welding and brazing.

Barnes Drill Chairman Retires

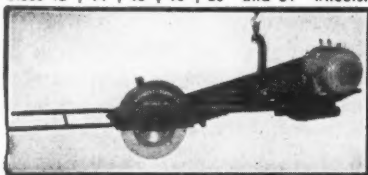
Barnes Drill Co., Rockford, Ill., has announced the retirement of A. M. Johnson as chairman after 45 years of service with the company. W. M. Fair-

bairn succeeds Mr. Johnson as chairman. Mr. Fairbairn has completed 43 years of service with the company and was president and general manager since 1947.

Reed M. Andress has been promoted to the position of president and general manager. He has completed 31 years of company service and was executive vice president previous to this promotion. Other officers of the company are Roger Marriott, executive vice president; A. G. Block, vice president, secretary, and treasurer; and Harold A. Johnson, vice president and assistant secretary.

MUMMERT-DIXON SWING FRAME GRINDERS

Sizes 12", 14", 16", 18", 20" and 24" wheels.



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.

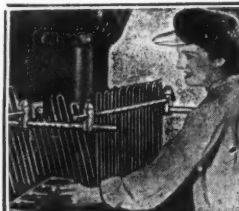
SAWING MILLING

GROB BROTHERS
GRAFTON WISCONSIN

Rockwell Acquires New Company

W. F. Rockwell, Jr., president of Rockwell Mfg. Co., Pittsburgh 8, Pa., has announced the acquisition of the Deluxe Saw & Tool Company and the Karbide King Tool Corporation. These companies started in business in 1945 and operate plants in Chicago, Illinois, and High Point, North Carolina.

The Deluxe Saw & Tool Company manufactures tungsten carbide-tipped circular saws for cutting metals, wood, plastic, hardboards, and fibers. The Chicago plant will remain under the supervision of A. G. Feldman, one of the founders of Deluxe, and Claud T. Miller will manage the High Point plant.



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SAFGUARD
FOR PUNCH
PRESSES**

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P. O. BOX 762

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LOS ANGELES 44, CALIF.

DO YOU MANUFACTURE PUZZLES?

How many man hours are lost every day in your plant because metal components are not properly marked?

How much time do your customers spend trying to identify parts for re-ordering?

Are you losing good business because your components are not permanently and legibly marked for *instant identification*?

Would the use of modern marking equipment save you money?

Simply send prints or samples of parts to be marked, together with exact lettering and its location, for free recommendations.

WRITE FOR CATALOG

MARKING MACHINES — ENGRAVED
STAMPING AND EMBOSING DIES —
SPECIAL MARKING TOOLS — NUM-
BERING HEADS — HAND STAMPS



GEO. T. SCHMIDT, INC.

1806 W. BELLE PLAINE AVE.
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Citco Completes \$700,000 Building and Equipment Expansion Program

Joe Loecy, Jr., president of the Cleveland Industrial Tool Corp., Cleveland 17, Ohio, manufacturer of Citco Solid Copper Diamond Tools and Citco Hydraulic Diamond Turners, has announced the completion of a \$700,000.00 building and equipment program for the further production of its

hydraulic diamond turners and high precision aircraft parts. Both the Citco Division and Aircraft Parts Division of the Cleveland Industrial Tool Corporation are working at full capacity at the present time.



Joe Loecy, Jr.

L. Red Zeman, prominent Cornell University alumnus, formerly associated with Trundle Engineering Company, has been appointed vice president and general manager. Lee Loecy has taken active charge of the Citco Diamond Tool Division of Cleveland Industrial Tool Corporation. Walter Borsits has been promoted to plant superintendent of Aircraft Parts Division.

"THE ORIGINAL"
MAUSER PRECISION VERNIER CALIPER
\$14.75 PPD

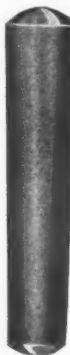
NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS. THE MAUSER TRADEMARK... IS YOUR PROTECTION.

MONEY BACK GUARANTEE
 FOR MEASURING INSIDE, OUTSIDE, AND DEPTH.
 3 GRADUATIONS
 1/1000" - 1/128"
 1/10 mm. IN BACK

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STANDARD

TAPER PINS



The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY COMPANY

BEAVER FALLS

PENNSYLVANIA

PLANTS: BEAVER FALLS, PA. • HAMMOND, IND.

Stemac Purchases Engraving Business

Announcement of the purchase of the W. L. Freeman Mechanical Engraving Company of Denver and the consolidation of all phases of the business at 1277 S. Cherokee St., Denver, Colorado, has been announced by the Stemac Company. The enlarged facilities of the company will include

Quick Shipment on

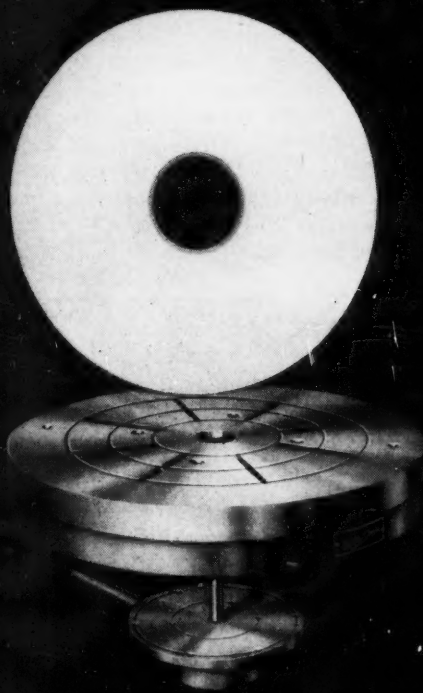
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 9" to 36" Swing
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 4531 N. Beacon St., Chicago 40
 Excl. Mfrs. of Taper Attachments

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Does It
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THE PROBLEM: To hold a disc of tightly coiled cigarette paper ($3\frac{1}{2}$ miles long) in order to machine it to exact width (29 millimeters).

THE SOLUTION: Walker Engineers designed this 24" ROTARY VACUUM CHUCK.

YOUR HOLDING PROBLEMS involving aluminum, brass, glass or other non-magnetic material can be solved by WALKER.

Original Designers and Builders of Magnetic Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

die casting; manufacturing of machine tools; steel stamps and dies; name and data plates; tracer control milling; and two and three-dimensional engraving. A brochure outlining the services and facilities of the organization is available on request.

Summer Management Course

The College of Engineering, State University of Iowa, has announced the

thirteenth Summer Management Course to be held June 9 through June 21, 1952 in Iowa City. Since its inception, nearly 900 representatives of American and foreign industries have increased their understanding of the design and application of the major management techniques. It is an intensive course for factory managers, foremen, industrial engineers, methods and

timestudy analysts, cost accountants, and office executives. The areas of Production Planning, Job Evaluation, Motion Study, Wage Incentives, Plant Layout, Quality Control, Supervisory Training, Labor Relations and Legislation, Organization and Policy, and Public Speaking are included.

The regular State University of Iowa teaching staff will be augmented by outstanding men from a variety of industries and other educational institutions. Communications concerning the course should be sent direct to Wayne Deegan, 113 Engineering Building, State University of Iowa, Iowa City, Iowa.



**CUT OFF TO ACCURATE LENGTH
AND**

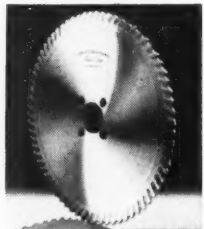
Stop Scrap!

**The MOTCH &
MERRYWEATHER
is**

the Way to That End



*Segmental blade
illustrated.*



Don't be guilty of wasting metal. Cut off all shapes and sizes of ferrous and non-ferrous metals to accurate lengths. Segmental blades for large stock; solid blades for smaller. Let your local M. & M. dealer show the way to less waste.

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COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING





ADAMS quality control speeds up assembly time

Adams precision-made gears are rigidly inspected throughout every stage of their manufacture . . . to conform exactly to your specifications.

Gears made especially for the job save you valuable time by simplifying and speeding up assembly time. While your product is still on the boards, plan on using Adams precision-made gears. THE ADAMS COMPANY, 1942 Cypress Street, Dubuque, Iowa.

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SPUR GEARS

HELICAL GEARS

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GEARS

WORMS AND WORM
GEARS

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INTERNAL GEARS
(Spur and Helical)

RATCHETS

SPLINED SHAFTS
RACKS

LEAD AND FEED
SCREWS

SHAVED TOOTH
GEARS (Spur and
Helical)

GROUND THREAD
WORMS

The ADAMS Company

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

FINE GEARS MADE TO
YOUR SPECIFICATIONS



Janette Manufacturing Company Now Operating in New Plant

The Janette Manufacturing Company, formerly located at 556 W. Monroe St., Chicago, Ill., is now operating in its new plant, a modern single-story building erected on a nine-acre site at Lehigh and Main Sts., Morton Grove, Ill. Built at a cost of approximately \$1,500,000, the new plant provides 100,000 square feet of floor space and houses company executive offices and complete production facilities, which have been expanded with the addition of new machine tools and other precision equipment. Company officials believe that greater speed and efficiency will be achieved through a new enlarged assembly line which completes the production operation on one floor.

The Janette Manufacturing Company, a subsidiary of the Gerity-Michigan Corporation, is a 40-odd-year-old

manufacturer of gearmotors, speed reducers, converters, and motor generators.

Allied Products to Expand Hillsdale, Michigan Plant

Ralph Hubbard, president of Allied Products Corporation, Detroit, has announced that contracts have been let for the construction of an addition to one of the company's plants in Hillsdale, Michigan. This plant is devoted exclusively to the production of hardened and precision ground parts of which the principal volume is aircraft engine parts.

The expansion will provide for an increased production of approximately 50 per cent and will increase the employment in this one plant by about 200 people. Operations in the new addition will be started on a modified basis about the first of August.



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of Vises, Work Positioners and
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CHICAGO 14, ILLINOIS

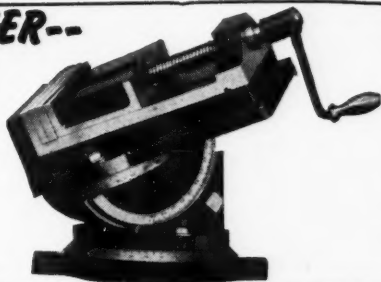
MAKE SET-UPS **FASTER--**

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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DONOVAN MFG. CO.

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STOP Oily Floor Mishaps with **FULLER'S EARTH**

Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease — and it's non-inflammable. Write for **FREE SAMPLE** to test.

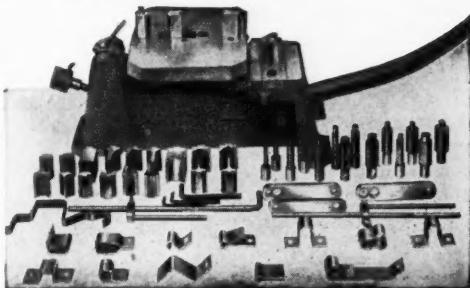
TAMMS

Dept. RM-9, **TAMMS INDUSTRIES, Inc.**, 228 N. LaSalle Street, Chicago 1

THE *Multiform* **BENDER** WILL CUT YOUR COST

● NO SPECIAL TOOLING

Bends — Cuts — Punches —
Flats — Rounds Into Any
Shape — Clamps — Brack-
ets — Springs — Busbars —
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Work — Steel Rule Dies, Etc.

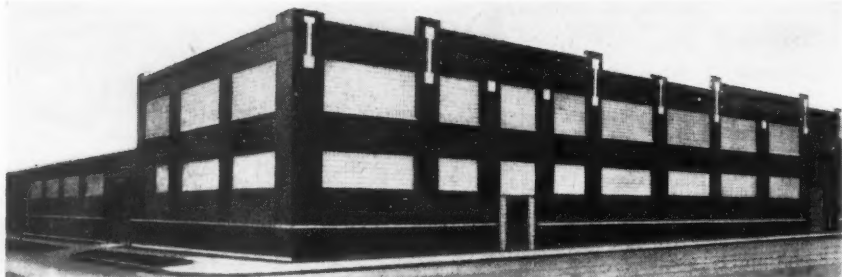


AIR OR HAND MODELS FOR UP TO
1/4" x 4" MATERIAL.

J. A. RICHARDS CO.

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KALAMAZOO, MICHIGAN

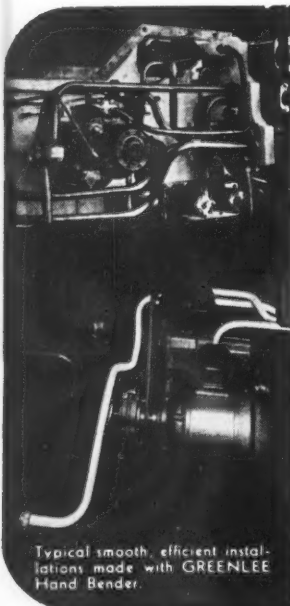


Additional building purchased by The Cross Co., Detroit, Mich., for machine tool production.

Cross Adds New Plant for Increased Machine Tool Capacity

Plans for greatly expanding facilities for manufacturing machine tools at The Cross Company, 3250 Bellevue, Detroit 7, Mich., have been announced by Milton O. Cross, Jr., and Ralph E. Cross, managing directors. Over 33,000 square feet of floor space have been

added by the purchase of a two-story brick building at the southwest corner of Mack and Bellevue across the street from Cross' main plant. Another factory located at 9527 Traverse in Detroit is also occupied by The Cross Company. The three buildings give the company a total of 84,000 square feet for the manufacturing of the machine tools. In addition, the company main-



Typical smooth, efficient installations made with GREENLEE Hand Bender.

SMOOTH, accurate small-radius bends made quickly in pipe, tubing, conduit with Greenlee Hand Bender

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines . . . especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit. Write for facts. Greenlee Tool Co., 1984 Herbert Avenue, Rockford, Ill.





"SHUR-GRIP" DROP FORGED HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly—will not slip—keeps hammer head in shape longer—to make remolding easier, quicker, surer, less expensive. Write for folder.

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We are fully equipped to **GRIND OR MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

Your inquiries answered promptly.

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Five Models for

**LATHES, SHAPERS, PLANERS,
AND BORING MILLS.**

RANGE $\frac{1}{2}$ " TO 3" RADIUS (MODELS ALSO
AVAILABLE FOR CONVEX CUTTING, AND
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ACROMARK

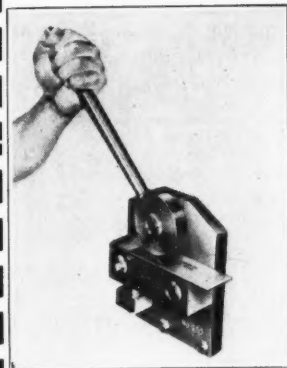
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(SERIES 9A—POWER DRIVEN)

Are the last word for high production, high precision marking.

A powerful gear reduction motor does the driving. Clutch operated. Fast, smooth and quiet.

MODEL 9AMP—MOTOR DRIVEN, PEDESTAL MODEL SHOWN—>



HAND MARKING MACHINES No. 920

Shown at left are frictionless. A double row SKF precision ball bearing carries the plate or part as it passes under the roller die.



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tains 14,000 square feet of storage space.

Extensive remodeling of the newly acquired building is now under way. Offices will be occupied by an expanded engineering staff. Factory space will be used for final assembly of special machine tools. By concentrating small parts manufacturing at the Traverse plant, large parts at the original factory, and final assembly in

the new building, Cross expects to increase its production by at least 50 per cent over 1951. Approximately 100 additional employees, bringing the total up to 325, will be needed for the expanded operations. Over \$1,000,000 worth of new machinery is being installed.

General Offices of Crucible Established in Pittsburgh

The general offices of Crucible Steel Company of America have been established in Pittsburgh, according to an announcement made by W. P. Snyder, Jr., chairman of the board. Crucible's quarters in the Oliver Building have been enlarged several times since 1945 and, with this move, the number of people in the Pittsburgh offices will be more than 200, compared with about 30, seven years ago. W. H. Colvin, Jr., president, will establish an office in Pittsburgh.

The Crucible executive headquarters are being returned to Pittsburgh where they were located from the founding of the company in 1900 to 1921. For the past 31 years the general offices have been in New York's Chrysler Building where a large office will remain. Mr. Snyder, whose headquarters have always been in Pittsburgh, was elected chairman of Cruci-

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Black Pentrate — \$6.95
Satin Chrome — 7.95
1/32" Contact, 1/2" long extension — .75



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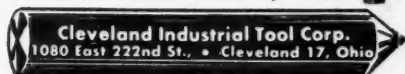
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THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

ble in 1944, and has been a director of the company since 1930. Since 1947, R. S. Poister, vice president in charge of operations, has made his headquarters in Pittsburgh. Sales headquarters were established there in 1949 when W. H. Wiewel became vice president in charge of sales. In line with the move, Joel Hunter, vice president in charge of finance, will establish a Pittsburgh office.

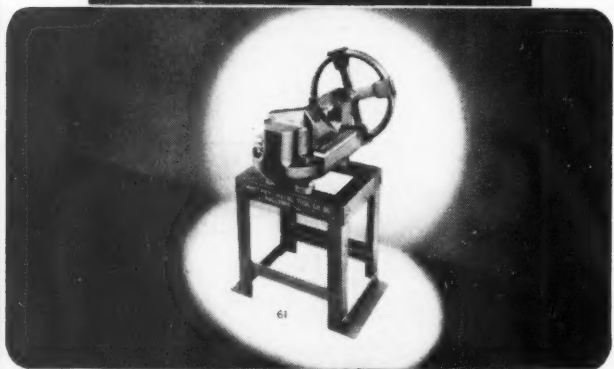
Raybestos-Manhattan Installs World's Largest Conveyor Belt Testing Machine

Designed by Raybestos-Manhattan engineers, a laboratory conveyor belt testing machine which is believed to be the largest in the world is now in operation at Raybestos - Manhattan's laboratory in Passaic, N. J. Intended to benefit industries that move bulk material in large volume, the machine

is said to differ from laboratory test models in that it is designed to accommodate production - scale belts up to 30 inches wide by 80 feet long so as to include belt widths in general use.

The machine is said to test, up to 200,000 lb. total tension, any 30-inch wide x 80-foot-long conveyor belt. Duplicating actual conveyor equipment arrangement of head, snub, bend, take-up and tail pulleys, with adjustable angle and elevation of troughing idler pulleys, automatic recorders trace simultaneously, power input, stretch, tension, and speed at any speed up to 2,000 f.p.m.

WHITNEY METAL TOOL COMPANY 41 YEARS EXPERIENCE



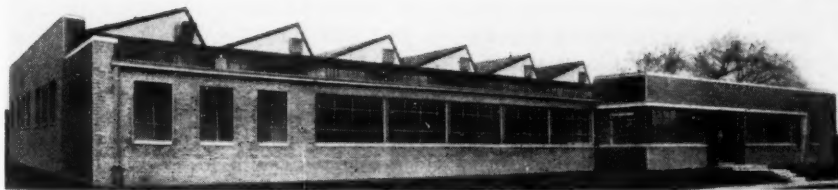
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No. 61

ANGLE IRON BENDER

An extremely useful tool, especially where quantities of larger angle iron is formed. Capacity 3" x 3" x 3/8", all sizes of angle iron and flat bars. This bender can be bench or floor mounted. Four 18" operating bar handles are furnished.

WHITNEY METAL TOOL COMPANY
110 FORBES STREET, ROCKFORD, ILLINOIS




New plant in Butler, Wisconsin, now being occupied by the Wisconsin Drill Head Company.

Drill Head Manufacturer Occupies New Plant

The Wisconsin Drill Head Co., formerly located in Milwaukee, has recently moved into a new plant in suburban Butler, Wisconsin. The new plant provides increased floor space for both the manufacturing and engineering departments, improved production facilities, and a modern office.

According to company officials, the expansion will be reflected in rapidly

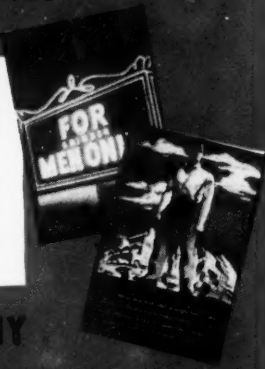
increasing production of Wisconsin's standard line of multiple adjustable drill heads, multiple fixed-spindle heads and special drill heads of various types, as well as special heads for a variety of boring, tapping, and spotfacing operations. The company's standard line of multiple adjustable drill heads include two to eight-spindle models with various capacities. Heads with more than eight spindles, and other special heads, are built to order.



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- ★ Put up posters on your tool cribs. Hand out booklets to your operators, telling them how to **USE—NOT ABUSE** their diamond tools.
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C. R. Meyer Appointed Vice President and Secretary of Morris Machine Tool Company

The appointment of Clifford R. Meyer as vice president and secretary of The Morris Machine Tool Co., Cincinnati 3, Ohio, has been announced by the firm's board of directors. For the past four years, Mr. Meyer has served as secretary at the company, which, for more than 30 years, has

manufactured radial drills and more recently high production machine tools and special automatic piston balancing equipment. A graduate of the University of Cincinnati in business administration, Mr. Meyer



Clifford R. Meyer

was an officer with the Navy in the Pacific during World War II.

Cooperative Plan to Help Engineering Students

In recognition of the rapidly growing shortage of engineers in the United States, the American Society of Tool Engineers' program of providing financial aid to students in engineering schools has been further extended by enlisting the financial assistance of industrial companies in areas where A. S. T. E. chapters are located. The program is already under way in several cities, including Boston, Detroit, Worcester, Mass., and New Haven, Conn., and operates by having the entire chapter proceeds of affiliate membership dues of participating companies in the technical society allo-

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Capacity— $1/8$ " hole thru $1/16$ gage iron.
Length— $8\frac{1}{2}$ "; Depth of throat—2".
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Stock size punches— $1/16$ " to $9/32$ " by $1/64$ ".
Can be had complete in metal box as shown or in cardboard carton.

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CUTTING TOOLS

for Increased
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KENAMETAL Inc LATROBE, PA.
CEMENTED CARBIDE TOOLS,
BLANKS, MILLING CUTTERS



cated to the providing of scholarships.

Among the companies in Detroit who have become affiliate members and are thus contributing directly to the program are General Motors Corp., Carboly Department of General Electric Co., The Budd Co., Micromatic Hone Corp., Ex-Cell-O Corp., Welding Equipment Supply Co., Chas. A. Cherry, Inc., Detroit Reamer & Tool Co., Gairing Tool Co., National Twist Drill & Tool Co., Douglas Tool Co., and Davis Tool & Engineering Co. In Massachusetts, the following companies have joined in the effort: Gillette Safety Razor Co., Avery & Saul Co., Control Engineering Corp., J. W. Moore Machine Co., Victory Plastics Co., H. K. Porter Inc., W. H. Nichols Co., Scott & Williams, Waltham Precision Tool Co., LaPointe Machine Tool Co., and Norton Co. In New Haven, participating companies include Win-

chester Repeating Arms Co. and Farrel-Birmingham Company.

Financial assistance to students will be supplied within the chapter area in which the participating company is located and supplements the national scholarships awarded annually by the American Society of Tool Engineers. Scholarship awards are being made to those deserving 3rd, 4th and 5th year engineering students taking one or more courses in industrial or tool engineering subjects such as plant layout, machine and tool design, jig and fixture design, production methods and so on, at accredited engineering schools.

Peerless Machine Company Elects New Officers

C. O. Wanvig, Jr., formerly secretary of the Peerless Machine Co., Racine, Wis., was elected president of this



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THE *unusual* **ELLIS** DIVIDING HEAD

"Versatile" is the word for the unusual Ellis Dividing Head. This beautifully designed and built unit can extend the profit and production possibilities of your mills, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Its fully universal action provides every needed setting, so that most work can be completed without rehandling. Work may be held between centers, or in chucks or collets. Write for catalog giving complete details!

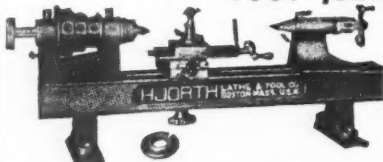
NICHOLS-MORRIS CORPORATION 50-H CHURCH STREET
NEW YORK 7, N. Y.

organization at a recent directors' meeting. He succeeds the late J. R. McDonald who for many years served as company president.

Five directors were also chosen at the regular stockholders' meeting. These directors include C. O. Wanvig, Sr., formerly vice president and treasurer, who becomes chairman of the board; C. O. Wanvig, Jr., president; William M. Wanvig, Frank T. Frey,

and J. P. Hanson. Other company officials announced by the new board chairman are as follows: Frank T. Frey, vice president; O. M. Jensen, vice president in charge of engineering; Frank T. Wruk, vice president in charge of sales; and J. P. Hanson, secretary and treasurer. In addition to the elected officers, Otto Geschke has been appointed assistant secretary and purchasing agent; Walter Sorenson, assistant treasurer; O. H. Felberg, superintendent; and Leroy May, production control director.

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Conference on Machining Metals

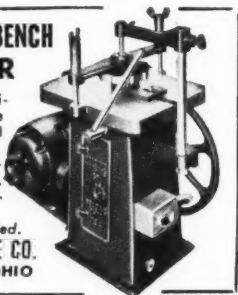
The South's first conference on the machining of metals will be held in Knoxville at the University of Tennessee on May 1 and 2. Designed to serve management representatives and supervisors in Dixie's rapidly-expanding defense industry, the two - day meet will feature practical techniques for determining machining specifications, power requirements, and answers to newer problems such as the machining of stainless steel.

The conference will be jointly sponsored by the U - T Mechanical Engineering Department and Division of University Extension, the American Society for Metals and the American Society of Mechanical Engineers.

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Portable—move directly to job; a time saver for both small and large shops.
3 $\frac{3}{4}$ " stroke; adaptable for other work.
Low first cost—prompt delivery.

Good dealers wanted.
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M.I.T. Summer Courses

New developments in five phases of mechanical engineering will be emphasized in special courses in Metal Cutting, Internal Combustion Engines, Lubrication Engineering, Vibration, and Industrial Photoelasticity to be given at the Massachusetts Institute of Technology during the summer of 1952. The course in Metal Cutting will be given from May 26 to June 6; in Internal Combustion Engines from June 9 to June 20; in Lubrication Engineering from June 23 to July 3; in Vibration from August 4 to August 15; and in Industrial Photoelasticity from August 18 to August 30.

All facilities of M. I. T. will be open to members of summer session courses. Requests for application forms or for further information on these special summer courses should be addressed to Dr. Ernest H. Huntress, Director of the Summer Session, Room 3-107, Massachusetts Institute of Technology, Cambridge 39, Massachusetts.



April, 1952

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Metal-Working News in Brief

The Eighth Annual National Electronics Conference will be held September 29, 30, and October 1, 1952 at the Sherman Hotel in Chicago, Illinois. Complete information regarding the conference is available from S. R. Collis, Chairman, N. E. C. Publicity Committee, 208 W. Washington St., Chicago, Illinois.

Jack Dustman, who has resigned his position as sales manager of Detroit Broach Company, has announced the establishment of a sales agency at 4022 Carrollton Ave., Indianapolis, Ind., to serve industrial customers in Indiana and southwestern Ohio.

— o —

The Latrobe Electric Steel Co., Latrobe, Pa., sole producer of "Degreased" high speed steels and high

carbon-high chromium die steels, has announced the opening of a branch office at 5475 Delmar Blvd., St. Louis 12, Mo. Under the direction of Mr. Sundstrom, district manager, this office will service tool and die steel users in Missouri, Kansas, Oklahoma, Arkansas, and southern Illinois.

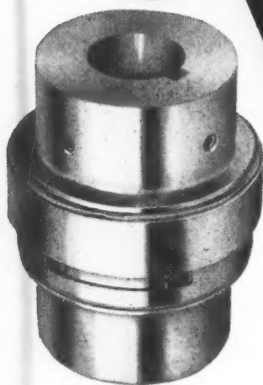
— o —

Dale D. Spoor, former chief of the Industries Branch of the Metalworking Equipment Division of N. P. A., has been appointed manager of the equipment and process sales department of Air Reduction Sales Co., 60 E. 42nd St., New York 17, New York.

STOP VIBRATION.....

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LOVEJOY FLEXIBLE COUPLINGS



By use of special cushion materials, Lovejoy Flexible Couplings stop vibration due to misalignment of shafts and vibration inherent in either connected machine! Shock, backlash and surge are also absorbed—instantly and permanently. No shutdowns for changing cushions, which are available for every service . . . 1/6 to 2500 H.P. No lubrication ever needed.



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Also Mfrs. of Lovejoy Universal Joints and Lovejoy Variable Speed Transmissions

Metal-Working News in Brief

The Mid-West Abrasive Co., Owosso, Mich., manufacturer of sandpaper, grinding wheels, honing stones and abrasive grain, has announced that **R. J. Foresman**, general sales manager of the company, has been elected to the board of directors to fill the vacancy occasioned by the death of the late Phil Huber. The company has also announced that **J. A. Kretzschmar** has been elected assistant secretary and **V. O. Smith** assistant treasurer.

— o —

Sheldon V. Coleman has been appointed sales engineer with the Norbide Division and Floors Division of Norton Co., Worcester 6, Mass., succeeding **Henry O. Richter** who has retired after 38 years and 9 months of service with the company.

— o —

Roland R. Preston, die sales engineer in the Pittsburgh office of the Carboloy Department of General Electric Co., died recently at the age of 64 after a short illness.

The appointment of **G. G. Willson** as manager of the technical service section of the "3M" coated abrasives laboratory has been announced by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Mr. Willson will be responsible for all technical service functions of the laboratory, as well as a technical training program recently instituted for selected 3M sales personnel.

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Stress Engineered **ARBOR PRESSES**

for greater STRENGTH

Stress-Engineered to put every pound of metal to work—to increase overall strength!

Features:

Big capacity! Heavy, stub-tooth alloy steel rack and pinion gears; Ram take-up adjustments; Lever or handwheel operation, plain tables or with platen. 3 Sizes: ½, 1 and 2 Tons.

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WORLD'S LARGEST MFGRS. OF SMALL PUNCH PRESSES AND MILLS



Metal-Working News in Brief

The Billings & Spencer Co., Hartford 1, Conn., manufacturer of wrenches and shop tools, has announced the appointment of **John C. Fremlin** as representative for the Michigan territory. Mr. Fremlin will make his headquarters in Milford, Michigan, from where he will serve industrial distributors and hardware wholesalers throughout the state.

James A. Nelson has joined American Machine & Foundry Co., New York 17, N. Y., as manufacturing assistant to the vice president and general manager of the General Products Division. In his new post, Mr. Nelson will supervise, in a staff capacity, manufacturing operations of several AMF subsidiaries, including DeWalt Inc., Lancaster, Pa.; Cleveland Welding Co., Cleveland, Ohio; Junior Toy Corp., Hammond, Ind.; Sterling Engineering Co., Laconia, N. H.; and Float-Lock Corp., Bloomfield, New Jersey.

— o —

The Materials Handling Division of the Market Forge Co., Everett 49, Mass., has announced the appointment of the **Jonathan Handy Co.**, 38 Bethel St., New Bedford, Mass., as its local distributor in that area. **Jack Somers** will be in charge of sales of the complete line of materials handling equipment, including lift trucks (electric and hand operated), floor trucks, conveyors, racks, containers, and various specialized equipment.



BARNES "SKIP TOOTH"

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HIGH SPEED
CUTTING
OF
SOFT
NON-FERROUS
METALS
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SKIP TOOTH IS A HARD EDGE
FLEXIBLE BACK BLADE

The teeth of Barnes "SKIP TOOTH" are of special design and proportion in relation to the pitch or teeth per inch. The result is greater gullet capacity permitting fast cutting through heavy sections of non-ferrous metals with excellent chip clearance. Skip Tooth is recommended for plastics, rubber, wood, cork, etc. The hardened, widely spaced teeth cut freely and remain cooler at high speeds.

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Barnes Band Saw folder

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W. O. BARNES CO., INC.
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Metal-Working News in Brief

The appointment of **Patrick J. Gleason** as general manager has been announced by Tap & Drill E-Z Corp., El Segundo, Calif., manufacturer of "Lubri-Cut" tap and drill lubricant.

— o —

Clifford S. Anderson, advisory counsel for Norton Co., Worcester 6, Mass., has been elected a member-emeritus of the National Industrial Conference Board Incorporated for a period of five years. **Wallace T. Montague**, vice president of Norton, has been elected a member of the board for a term of one year, replacing Mr. Anderson.

— o —

A. W. Miller, president, Portable Electric Tools, Inc., Chicago, Ill., has announced the appointment of **Z. R. Williams** as vice president and works manager. Mr. Williams has been associated with the company since 1946, has had broad experience in both personnel work and in the production of rotary devices and equipment.

Edward W. Miller, president of The Fellows Gear Shaper Co., Springfield, Vt., has also been elected general manager. **Edwin R. Fellows, II**, has been elected a director and appointed assistant general manager. Mr. Fellows will also continue to serve as manager of the export department, with **Aldrien Carlton** as assistant export manager. **Roger M. Knox** has been named assistant to the president.

PRECISION KEYWAYS

with an **ADJUSTABLE**
GLENNY PUSH BROACH



Production or short-run keyway cutting can be accomplished in all types of bushings, sleeves, gears, etc., with the GLENNY adjustable push broach. Featuring 0.0005-inch accuracy, it can be instantly adjusted and micrometer checked for precision operations.

SPECIFY GLENNY . . . greater strength . . . maximum accuracy . . . fully adjustable for depth . . . interchangeable high-speed blades . . . bushing adapters available . . . will cut tapered keyways . . . hardened tool-steel external parts . . .

GLENNY broach sets are available for cutting keyways in bores ranging in diameter from 1/4 to 2 1/2 inches.



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STREET _____
CITY _____ ZONE _____ STATE _____

Metal-Working News in Brief

Safety Socket Screw Co., 6500 Avondale Ave., Chicago, Ill., has announced the completion of additional plant construction which increases its production facilities by more than 25 per cent. This addition, according to C. W. Payne, general manager, will be used for first operation work, as well as for warehouse space.

In keeping with its expansion program, Morton Machine Works, Ferndale, Mich., has appointed **Howard C. Carlson**, former general manager of Ramsey Electric Company, as general office manager.

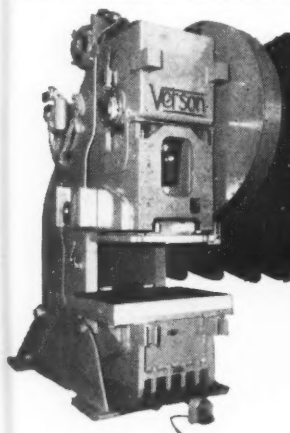
— o —

The appointment of **Richard C. Lawson** as assistant manager, Railroad and Spring Sales Department, Crucible Steel Company of America,

has been announced by W. H. Wiewel, vice president in charge of sales. Mr. Lawson's headquarters will be in New York.

— o —

The appointment of **S. L. Johnson** as manager of the New Methods Development Division of the "3M" Coated Abrasives Division has been announced by Minnesota Mining & Manufacturing Co., St. Paul 6, Minn. Mr. Johnson will direct the development of new machinery and techniques for conditioning carbon and alloy steels and the development of improved methods for grinding and finishing other metals.



**You get BIG Press
Standards of
Construction
and Performance**

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O.B.I.'s

When you can combine the versatility of an O.B.I. press with the construction and performance standards of big, expensive machines, you get a real production tool that will give you the best possible long term economy . . . And that's just what you get with Verson O.B.I.'s. Just check these features—gears running in oil . . . heavy allsteel frame . . . machine cut steel gear and pinion . . . split cap main and crankpin bearings . . . mechanically interlocked pneumatic clutch and brake unit . . . full electric controls . . . many others.

Six models with capacities from 90 to 250 tons. Write for Bulletin OBI-49.

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DALLAS 15, TEXAS

**THERE'S A VERNON PRESS FOR EVERY JOB
FROM 15 TONS UP**

Metal-Working News in Brief

Ronald J. Ahern, president of The Billings & Spencer Co., Hartford Conn., manufacturer of wrenches, shop tools, and commercial forgings, has been appointed to the Drop Forging Industry Advisory Committee of the National Production Authority. Mr. Ahern is one of fourteen executives of the drop forging industries serving on the committee.

— o —

W. T. Ingram has been appointed general sales manager of the Pacific Coast region for Reynolds Metals Co., Louisville, Ky. **W. K. Allen Ferguson**, Mr. Ingram's predecessor, has been appointed general director of pricing, general sales organization, with headquarters in Louisville. **Hayden Clement** has been transferred from San Francisco to the company's Los Angeles office as sales manager of the packaging markets for the Pacific Coast region.

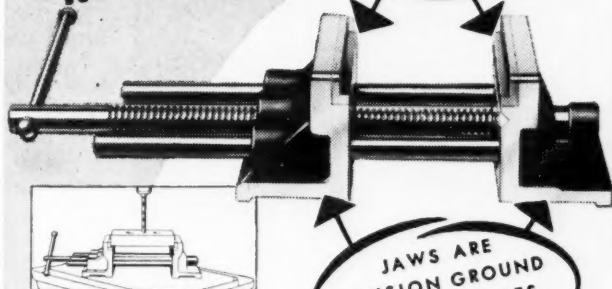
— o —

H. H. Hobelmann & Co., San Francisco, Calif., and **John T. Everett & Co.**,

Memphis, Tenn., have been appointed regional sales representatives for Carter Products, Inc., Grand Rapids, Mich., manufacturer of Carter Rigid Wheels and Quick-Change Tires, Carter Guides for band saws, the Guide Line Light for rip saws, plywood set-up tables, and other equipment. The Hobelmann firm will cover all of the Pacific Coast and western states, while the Everett company will be distributor for the entire South and southeastern states.

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A DRILL PRESS VISE THAT SAVES RESETTING

BUILT-IN PARALLELS AUTOMATICALLY SQUARE WORK



JAWS ARE PRECISION GROUND AT RIGHT ANGLES TO PARALLELS

DRILL FROM THE TOP

DRILL FROM EITHER SIDE

DRILL ROUND STOCK

Turn out more drill press work easily . . . drill from three directions accurately—with just a single setting of stock. The Heinrich Handy Drill Press Vise automatically squares work . . . built in V-groove permits precision side and end drilling of round stock. See your Distributor or write for further details.

HANDY DRILL PRESS VISE BY . . . **NATIONAL MACHINE TOOL CO.**
Dept. 112-D • RACINE, WISCONSIN

Metal-Working News in Brief

The appointment of **A. C. Paulson** as manager of the St. Paul branch of the Crucible Steel Company of American, New York 17, N. Y., has been announced by W. H. Wiewel, vice president in charge of sales. Mr. Paulson joined the Crucible organization in 1924 and his latest assignment was that of district representative in Rockford, Illinois.

Arthur Templeton has been appointed southwestern sales engineer for Templeton, Kenly & Co., Chicago, Ill. manufacturer of Simplex mechanical and hydraulic jacks. He will make his headquarters at 6505 Aberdeen Ave., Dallas, Texas, to cover the states of Texas, Oklahoma, and Louisiana.

— o —

The Mercury Clutch Division of Automatic Steel Products, Inc., Canton 6, Ohio, has announced the ap-

pointment of **John E. Cinkosky** as eastern zone manager. Mr. Cinkosky, formerly vice president of sales for the Centric Clutch Co., Woodbridge, N. J., will supervise the New England, Middle Atlantic, and South Atlantic territories.

— o —

Orrin W. Barker, assistant chief engineer at Kearney & Trecker Corp., Milwaukee 14, Wis., since 1936, has been named chief engineer. Mr. Barker has been continuously employed at Kearney & Trecker since 1925 and is credited with a number of patents in the field of machine tool development.

If you buy Cutting Tools



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Metal-Working News in Brief

George A. Fyrberg has been named production manager of the Abrasive Division of Norton Co., Worcester 6, Mass., succeeding **Harold C. Dunbar** who has retired after 39 years with the company. Mr. Fyrberg, who began his Norton career in 1915 with the stock department, has been order service superintendent since 1944.

— o —

A. R. Wise, vice president of The Cleveland Tapping Machine Co., Canton 6, Ohio, has announced that **L. H. Woods** has joined the company's sales organization. Mr. Woods was formerly associated with the Machine Tool Division of Strong, Carlisle & Hammond, Cleveland, Ohio.

— o —

Frederick J. Underwood has been appointed publicity manager and **Philip H. Warren, Jr.**, assistant publicity manager of The Heald Machine Co., Worcester 6, Mass. These men will handle both the advertising and public relations programs for the company.

Simonds Saw & Steel Co., Fitchburg, Mass., manufacturer of cutting tools, has announced the appointment of **Ducommun Metals & Supply Co.**, Los Angeles, Calif., as a distributor for Simonds products to western industry. Besides its main office and warehouse in Los Angeles, Ducommun maintains branch offices in San Francisco, Salt Lake City, Fresno, Bakersfield, San Diego and Phoenix, Arizona.



DYNAPRENE is better because it lasts longer. It is made of an exceptionally tough neoprene compound developed after extensive research and experience. It is made by the continuous vulcanizing process that guarantees accurate centering and even cure, eliminating thin, weak spots. DYNAPRENE is a truly modern cord made to withstand the rigors of constant use yet is priced only slightly higher than other types of cord that need frequent replacement.

Be sure to specify Whitney Blake I.C. type SO, SJO or SV-type neoprene jacket for your cord requirements.



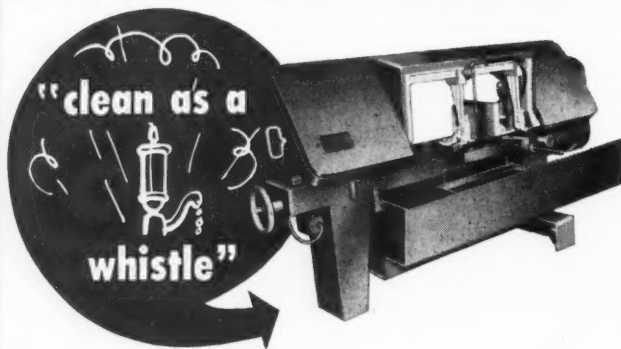
Metal-Working News in Brief

The election of **Leon F. Miller**, vice president in charge of sales and engineering of the Machine Division, as a director of The Osborn Mfg. Co., Cleveland, Ohio, has been announced by Norman F. Smith, president. Mr. Miller, a pioneer in foundry operations, joined the company in January 1929 as a draftsman after having attended Case Institute of Technology.

George A. Gade, manager of outside sales for the Standard Pressed Steel Company, has transferred his headquarters from Detroit to the SPS plant in Jenkintown, Pennsylvania. The move was made preparatory to readjusting the company's nation-wide sales organization due to increased demands for SPS products, which include socket head screws, lock nuts, aircraft specialty parts, and steel shop equipment.

— 0 —

NOW...CUT METAL



That's right. There's no burr and kerf is held to a bare minimum when cutting with a Kalamazoo Metal Cutting Band Saw! What's more, accuracy of a few thousandths can be maintained in cutting bars, rounds, angles and odd shapes.

Remember, for continuous or intermittent production cutting at *lowest cost... a Kalamazoo can't be beat!* Three sizes are available, all can be had with casters for complete portability. Before you specify any metal cutting band saw... investigate what Kalamazoo offers!

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

410 HARRISON ST., KALAMAZOO, MICHIGAN

The Cleco Division of Reed Roller Bit Co., Houston, Texas, has announced the appointment of **Arrow Supply Co., Inc.**, 3616 Liberty Ave., Pittsburgh 1, Pa; **Peerless Supply Co.**, 118 Grand Ave., Des Moines 9, Iowa; and **Bates Supply Co.**, 11 Vernon St., Quincy 69, Mass., as distributors for Cleco products in their areas. Cleco manufactures the Cleco and Dallett lines of air tools and accessories, including tools for construction, manufacturing, metal fabrication, foundries, industrial maintenance, and stone carving.

Metal-Working News in Brief

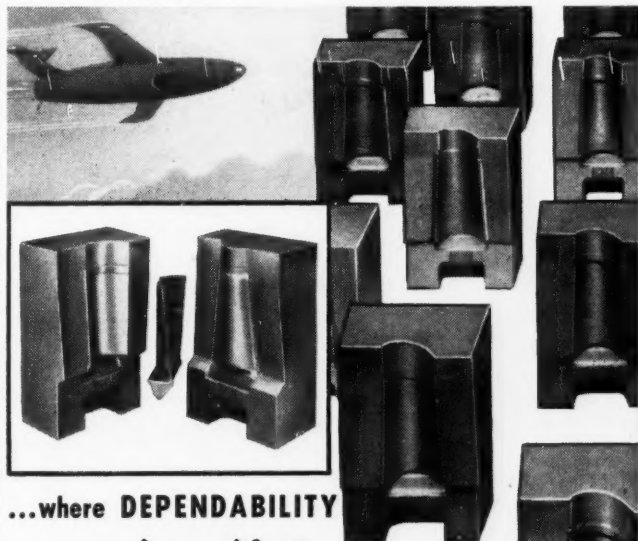
The **Walter F. Cahill Company**, manufacturers agent for tools, fixtures, production machinery, and precision gaging equipment, has announced its relocation from the New Center Building, Detroit, Mich., to new quarters at 17141 James Couzens Highway, Detroit

35, Mich. The organization, which consists of Walter F. Cahill, I. M. Wright, J. H. Nymberg, N. J. Gofrank, and J. J. Stone, is exclusive representative in Detroit for Lincoln Park Industries, Inc., The Gairing Tool Co., W. M. Ziegler Tool Co., Omer E. Robbins Co., Rennberg-Jacobson Mfg. Co., and Seneca Falls Machine Company.

— o —

George A. Bentley has been appointed sales manager of the Stamping Division, Detroit Stamping Co., and will make his headquarters at 350 Midland Ave., Detroit 3, Mich. Mr. Bentley has been with the company for the past 13 years.

Ed Swiatek has been appointed sales manager of the Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 22, Calif., manufacturer of punch presses, milling machines, power shears, turret presses, and lathes. Mr. Swiatek has had 18 years of experience in the machine tool business, ranging from operator to owner.



...where **DEPENDABILITY**
means *do or die!*

Hundreds of dies to produce turbo fins for new jet aircraft engines—all identical—all masterpieces of precision machining—every die measuring up to the rigid demands of aircraft perfectionist engineers.

There's no compromise with Dependability—Accuracy—Precision at Parker. Every facility for designing, engineering and building complex components or assemblies is coordinated in one smooth-working, efficient organization. Every Parker project is a do or die effort of perfection. Investigate the flexibility of PARKER'S facilities TODAY!

SEND FOR PARKER LITERATURE TODAY!



Metal-Working News in Brief

Imperial Stamp & Engraving Co., 4456 N. Western Ave., Chicago 25, Ill., has announced the appointment of **Shively Bros. Inc.**, Flint, Mich., as factory representative in the State of Michigan for Imperial's complete line of steel stamps, engraving and marking machines, and special marking equipment. Coincidentally, the company has announced the expansion of its manufacturing plant to facilitate deliveries of marking equipment.

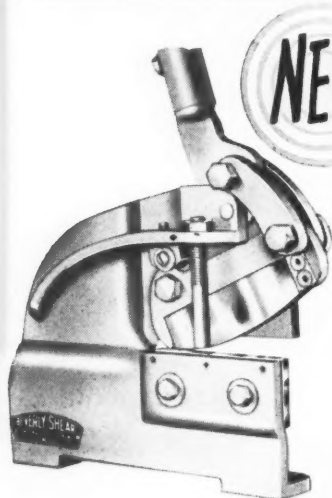
— o —

Opening of a new Boston branch sales office and warehouse has been announced by officials of **Minnesota Mining & Mfg. Co.**, St. Paul 6, Minn. The new building, a one-story structure featuring modern exterior and interior design, is located at 1330 Centre Street, Newton Center.

The Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has announced the appointment of Cleveland Tramrail Division, **W. A. York Co.**, 945 S. 53rd St., Philadelphia 43, Pa., as exclusive sales representative for Philadelphia and surrounding territory. All activity will be under the jurisdiction of **W. A. York**, who has been connected with the home office organization of Cleveland Tramrail as assistant chief engineer.

— o —

Kennametal Inc., Latrobe, Pa., has appointed **Gordon Kimball** as representative and tool engineer in the New England area, working out of the office at 1537 Main Street, Springfield, Massachusetts. **Thomas Fry** has been appointed application engineer in the Middle Atlantic district, working out of Kennametal's Philadelphia office.



SS-3 3/16" slitting cap;
5/16" trimming; 1/4"x2"
bar capacity.

NEW Beverly SLITTING SHEAR

**MORE POWER . . . Easier Cutting
EXCLUSIVE DESIGN . . . Cleaner Cuts
RUGGEDLY BUILT . . . Last a lifetime
CAPACITIES TO 3/16"**

Get faster, easier slitting and trimming with a new design Beverly "SS" Series Slitting Shear. Rigid, strongly braced frame; compounded linkage and extra strength where needed. Many exclusive features. Write for FREE illustrated Bulletin.

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Book Reviews

The Science of Precision Measurement. Published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. 256 pages. Illustrated. Price, \$3.50.

Prepared especially for instructors, students, and those who control dimensional accuracy in the production of precision parts, this book interprets the nationally and internationally accepted lineal standard of measurement by giving instruction and showing its practical application to production and inspection of manufactured parts. It explains the reading of millionths-of-an-inch with light wave interference bands and shows why such accuracy is necessary in properly controlling thousandths-inch production tolerances.

The book, which presents a complex subject in simplified form through the

use of diagrammatic illustrations, charts, and photographs, reveals practical procedures to be followed in utilizing precision measuring instruments such as gage blocks and gaging instruments—sine bars, optical flats, electric comparators, straightedges, squares, height gages, and so on. Supporting the use of these gaging instruments is a clarification of the terms "clearance" and "tolerance" and how to measure and establish angles, sur-

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IN YOUR OWN SHOP WITH THE
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Portable Model 1-5



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I-5-27—portable model
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The only portable machine which reproduces 15 sizes from one master alphabet.

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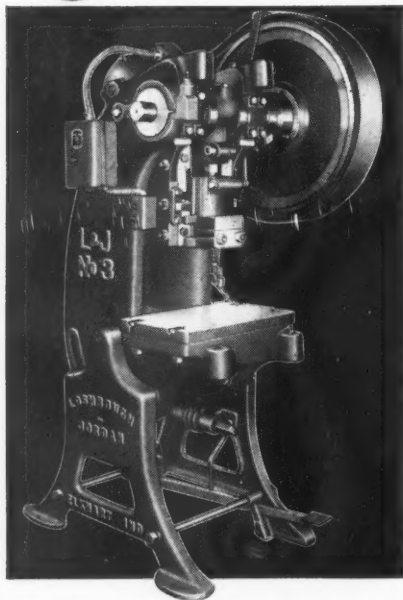
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It is the rigidity and accuracy of L & J Presses that gives them their outstanding reputation. Repeat orders from users is convincing proof of their performance. Put them to work and you'll see output climb. Production will meet exacting specifications—dies will last longer—and only a minimum of routine maintenance will be needed. L & J Presses are made in 12 O.B.I. models—back geared and plain flywheel types—and 8 sizes from 6 to 80 ton capacities. Air clutches optional.

Write for literature



face flatness, and parallelism.

The book introduces a new method of measurement using optical flats and the "visible scale" to determine surface flatness, finish, and parallelism, as well as heights, angles, and grain sizes. Also covered are recommended procedures for statistical sampling of parts for dimensional quality control and a discussion of mobile inspection systems for checking working gages and parts right at the point of production. Included are a number of charts and tables from which computations can be made for sines, linear expansion, conversion of fractions to decimals and inches to metric, thread gage tolerances, circumferences and areas of circles, trigonometric solutions to triangles, pin measurements, hardness scales, and tapers.

Elements of Hardenability. By M. A. Grossmann. Published by American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. 164 pages. Cloth binding, board covers. Price, \$4.50.

This book deals with quantitative aspects of hardenability and the principles underlying them. The fields of discussion in the book include new ways for measuring hardenability of diverse types of steel; severity of quench and its quantitative relationship to depth of hardening; exact measurements in isothermal transformation; martensite reaction; and the influence of alloying elements on hardenability.

The contents of the book are divided in four chapters headed as follows: Hardenability Tests; The Nature of Hardening; Nature of the Quenching Process; and Effects of Alloying Elements on Hardenability.

Safety Value (A Book of Poems). By Fred H. Colvin. Published by Exposition Press Inc., 386 Fourth Avenue, New York 16, N. Y. 96 pages. Cloth binding, board covers. Price, \$2.50.

The author of this book believes that there is no reason why an oxyacetylene torch should not have all the romantic qualities for the contemporary poet that the sun or a blazing comet had for the ancients. In this volume of poetry, Fred H. Colvin, has managed to bring beauty and dignity to such assorted subjects as machinists, craftsmen, draftsmen, patternmakers, maintenance men, and even "hard-hearted" foremen.

In making these the subjects of his verses, the author compresses memories of machine shop work, locomotive engineering, and a long career which started in 1894. Mr Colvin does confine

himself to the unusual but reveals a lively interest in the classical poetic themes of winter and spring and fascinating places. He also voices serious poetic ideas about political matters, economic affairs, and our ancestors; raises a protest against the threats to free speech; and pleads for tolerance to other races, nations, and ideas. His work reflects a belief in the spread of democracy by example, not force.

Selling to Industry. By Bernard Lester. Published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. 255 pages, 4½ x 6¾ inches. Cloth binding, board covers. Price, \$3.50.

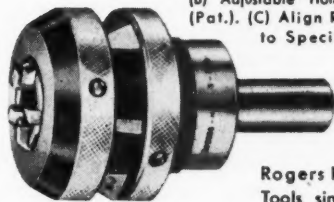
This compact, pocket-size book is described as a manual of practical ideas and suggestions for the sales engineer who wants to analyze and im-

ROGERS TOOLS



A

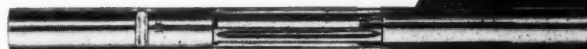
(A) Adjustable Blade Reamers.
(B) Adjustable Hollow Mills
(Pat.). (C) Align Reamers
to Specification.



B

Rogers Precision
Tools since 1885.

**PROMPT
DELIVERY**



C

Special Reamers, End Mills and
Cutting Tools with replaceable
blades to customer's specification.

THE JOHN M. ROGERS TOOL CO., GLOUCESTER CITY, N. J.

prove his methods of finding, contacting, selling, and servicing industrial customers. The author sets forth in a brief and realistic manner those key points which he has found to be most effective from a wealth of experience as sales executive for Westinghouse Electric Corporation, a lecturer on sales engineering and marketing at the University of Pittsburgh, Stevens Institute and Brooklyn Polytechnic Institute, and as a consultant on machinery and equipment marketing and selling.

The book is written in the form of short easy-to-read articles which are grouped in a series of sections entitled: Prospects are Our Market; Just How Do Prospects Buy; Sales Program Essentials; Make the Sales Program Effective; Successful Sales Interviews; Sell the Prospect's Employees; Be a Better Equipment Salesman; Getting Help from Others; Use All Sales Tools; Meet the Prospect's Objections; Follow Up the Customer's Decision; Grow in Power and Sales Skill; and When Orders Hang on Trees.

Largest Knuckle-Joint Press

WHAT is believed to be the largest knuckle-joint press ever built was recently shipped to Regal Ware, Inc., Kewaskum, Wis., by the E. W. Bliss Company. The press has a capacity of 4,000 tons, measures 34 feet high, and weighs 305 tons. Bed area is 60 x 70 inches; die space is 40 inches. The giant press will be used by Regal Ware for coining and extruding operations on steel artillery cases. Bliss equipped it with a six-station ratchet dial feed, 59 inches in diameter, with electrical protection for safer indexing. A 200 h.p. motor drives the press at 12 strokes per minute through double gearing. Slide adjustment of 1 inch is motorized with micrometer indication and can be readily locked in positive position.

Shown watching the press being run-in at the Bliss Toledo plant are E. J. Bootz, superintendent, Case Division of Regal Ware; A. G. Hron, works manager of Regal Ware; Norman Steel, Bliss senior engineer who designed the press; N. J. Kirk, Bliss vice president in charge of the Toledo Division; H. J. O'Connor, plant superintendent; G. Buehler, general foreman; and J. Dibling, assemblyman.



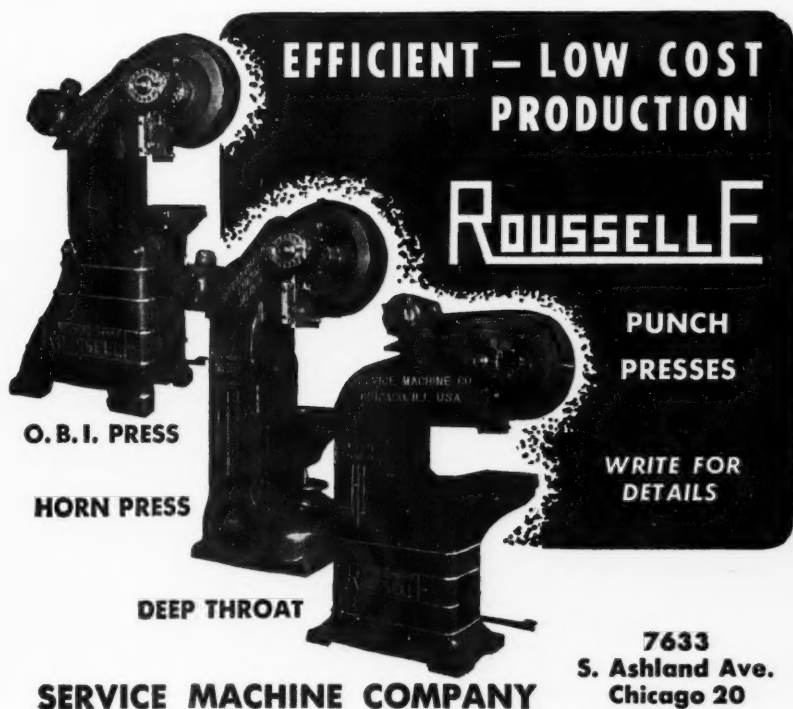
Band Tool Manual. Published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. 160 pages. Heavy paper covers. Illustrated. Price, \$2.00.

This manual is said to provide machine operators, students, and production planning engineers a comprehensive explanation of all band tools used in sawing, slicing, filing, grinding, and polishing operations. To broaden the know-how of this basic machining method, photographs and drawings are used throughout to define band tool terminology, the sixteen kinds of band tools, and their application to the machining of materials on band machines.

Conventional low-speed band machining, friction sawing, line grinding,

band filing and cutting of vitreous materials with diamond tooth blades are a few of the many applications shown for band machining. Supporting these applications is specific information concerning the performance of band tools and how they are set up on the band machine. This section deals with the characteristics of band tools as well as production rates, band tool life, use of coolants and lubricants, surface finish, and dimensional accuracy. Also shown and discussed are the selection and care of band tool guides, joining of blades into bands by butt welding, and corrective measures to be taken to overcome sawing problems.

A series of 82 band tool selection



**EFFICIENT — LOW COST
PRODUCTION**

ROUSSELL

**PUNCH
PRESSES**

**WRITE FOR
DETAILS**

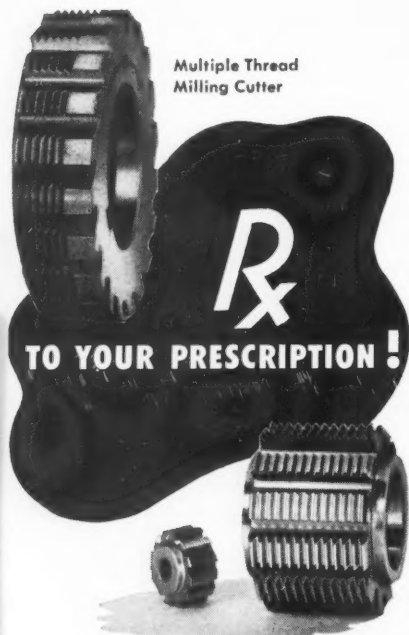
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DEEP THROAT

SERVICE MACHINE COMPANY

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Multiple Thread
Milling Cutter

Fine Pitch Gear Hobs

Call in the specialist — Hanson-Whitney to design and produce the multiple Thread Milling Cutter or Instrument Gear Hob that delivers production within specified accuracy.

- Cutters from $\frac{1}{4}$ " dia. to 8" dia. and larger. Internal or External. Thread length as required.
- Gear Hobs as fine as 200 D. P. and finer.

Complete engineering assistance at your request — no obligation.

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FROM START TO FINISH.

charts is contained in the manual. These charts are alphabetically arranged according to kind of material, such as aluminum, asbestos, brass, copper, fabrics, geological substances, glass, magnesium, plastics, rubber, steel, wood, metals, and alloys. They present recommended band machining factors for optimum cutting rate, tool life, and finish according to thickness of material. These factors cover selection of the kind of band tool to be used, its speed, pitch, feed, coolant and other related factors to be employed for efficient sawing, slicing, filing, grinding, and polishing operations.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



"At the employees party last night when everyone was singing that I was a 'jolly good fellow' didn't you substitute a couple of words for jolly good?"

Corrosion Film

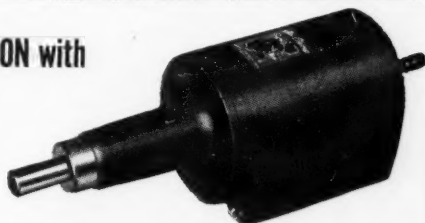
A new sound color film entitled "Corrosion in Action," has been prepared under the direction of the Corrosion Engineering Section of The International Nickel Company. The film, which is in three parts of two reels each, shows how corrosion works to cause annual loss in industry and elsewhere estimated at over six billion dollars. It also shows how this damage can be avoided or controlled by various means, such as by the selection of corrosion-resistant materials, by the development of new alloys to meet given situations, by the use of electric currents to provide cathodic protection, and by other methods.

The film has been so produced that it can be shown in one part, in any combination of two parts, or in the full three-part length, depending on the time available. Each part requires 20 minutes' showing time.

Almost every technique known to the motion picture industry was used in the filming of the picture, including animated drawings, slow motion dissolves

and time elapse photography. "Corrosion in Action" was made essentially for technical, educational and industrial groups, although its treatment is such that it can be understood by non-technical audiences. It is being released for use in schools, colleges, industrial plants, and before technical societies. Bookings can be made through the Corrosion Engineering Section, The Industrial Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

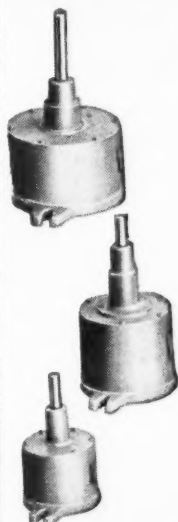
BOOST PRODUCTION with SINGLE ACTING



Air-Clamp*

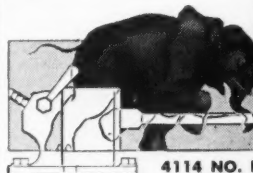
*Pneumatic Cylinders

Bore	Strokes	
	Horizontal	Vertical
1"	5/8"	5/8"
2 1/4"	1" 2" 3"	1" 2"
3"		1 1/2" 2"
4"	2" 2 1/2"	2"
5"	3"	3"
6"	3"	2"



NEW CATALOG READY!

Complete line of simple, adaptable, compact spring-return air cylinders. Cut costs and speed up production the modern, Air Power Way. Write today.



MEAD

SPECIALTIES COMPANY

4114 NO. KNOX AVE., DEPT. AA-42, CHICAGO 41, ILL.

New Shop Equipment

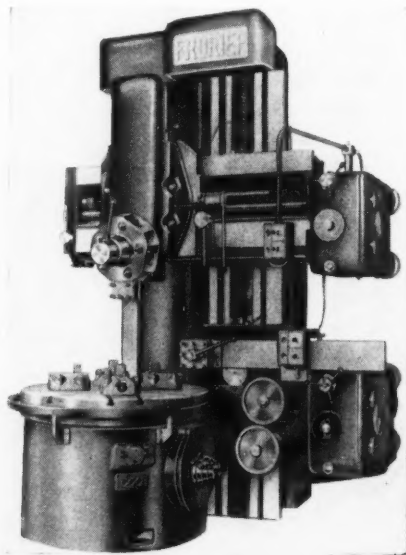
Vertical Boring and Turning Mill Is Constructed for Precise Machining

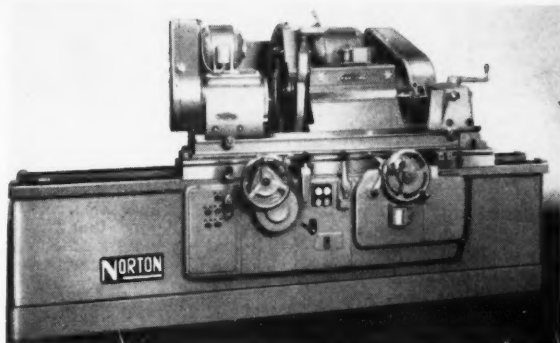
Cosa Corp., 405 Lexington Ave., New York 17, N. Y., has introduced the Froriep Single Column Vertical Boring and Turning Mill which is constructed to provide precise machining, extremely smooth surfaces, and maximum cutting efficiency with carbide or high speed tools. The rigidly bolted bed and column and wide base are heavily ribbed for quiet machining, even under heaviest loads. The crossrail slide head and the side arm head are completely independent. Each head is controlled by an individual set of feed and rapid return gears.

The geometrically graduated feeds for vertical and horizontal travel of the tools are controlled by three centrally placed levers. Engaging of all feeds and rapid return is effected by a single lever control from the operator's stand. The fine adjustment for the heads is located in such a manner on the slides that even with the smallest workpieces the tool cutting edge may be watched closely. The pentagon turret can be easily and accurately released, loosened and further divided with the help of a single lever.

The Froriep Vertical Mill is made in

Froriep Model KE-12 49-Inch Vertical Boring
and Turning Mill





Norton Type LCTU Cylindrical Grinder

Additional features and advantages of the Norton Type LCTU Cylindrical Grinder include enclosed electrical controls mounted for stand-up servicing; pumps and motors outside the base; a coolant cleanout ramp; and ribbon-type steel base way guards.

four sizes having 39, 49, 55, and 63-inch diameter tables and is said to accommodate workpieces weighing up to 5 tons. The machine can be furnished with thread cutting equipment, taper turning equipment, tripping device, tracing device with electric tracer control, and coolant system.

Cylindrical Grinder Swings Work up to 18 Inches

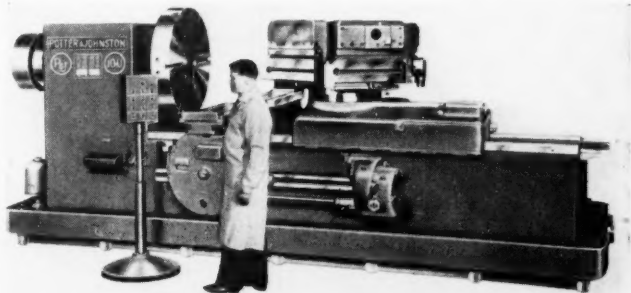
Light type work requiring up to 18-inch swing is said to be rapidly ground to finest limits of accuracy and finish in the Norton Type LCTU Cylindrical Grinder illustrated herewith, product of Norton Co., Worcester 6, Mass. The machine is made in six work lengths from 18 to 120 inches and is available in plain and semi-automatic types. Such features as preset truing and grinding speed, click-count wheel feed indexing, automatic work rotation, and coolant flow control are said to greatly simplify operation.

The wheel spindle unit is of rugged design, incorporating long full bearings that enclose a major portion of the spindle and are claimed to keep it on its fixed center line under any condition of load.

Turret Lathe Is Designed to Handle Large Jobs

The Potter & Johnson Co., Pawtucket, R. I., has announced the Potter & Johnson Model 10-U Automatic Turret Lathe illustrated herewith which is designed to handle large jobs and is equipped with a 75 h.p. multi V-belt drive, magnetic clutch, and brake. The machine has a 49-inch diameter swing over base ways, 36-inch diameter swing over cross slides for chucking, and 27-inch diameter swing over cross slides for machining. Individual front and rear cross slides, operating from separate timing boxes, can be controlled independently or simultaneously with the movement of the turret slide. Having a 25½-inch adjustment along the base ways, the front and rear cross slides and selected tools may be positioned to work from the rear and on the face of the workpieces at the same time that the turret tools are machining. The travel of the cross slides is fixed at 8½ inches.

The distance from spindle to turret is listed as 30 inches minimum and 50 inches



Potter & Johnson
Model 10-U Automatic
Turret Lathe

maximum. The distances, center to center, between the 5-inch wide base ways is 31 inches. The Model 10-U includes full electro-pneumatic control, hardened and ground speed gearing, air-operated chuck, and centralized control station for operating air chuck and all machine functions.

Super Sensitive Tapping Head Taps Steel at High Speed

Product of Winslow Product Engineering Corp., 5420 Jillson St., Los Angeles 22, Calif., the tapping head shown here-

with is designed expressly for tapping 0-80 to 4-40 holes in steel or other material at high speed and with sensitive feel of the tapping operation. In operation, the head is mounted on the spindle of a standard drill press. As provision for vertical travel of the tap is built into the tapping head itself, neither the control lever on the drill press nor vertical travel of the drill press spindle is utilized.

Control of the tapping operation is effected through a knurled collar just above the tap. This collar is held lightly in hand by the operator. A light downward pressure applied to the collar drives the tap into the work and a light

SYNTRON

Parts Feeders

Provide
Automatic
Oriented Position
Single Line Feeding

Will feed without damage
parts of most shapes,
sizes and
materials . . .



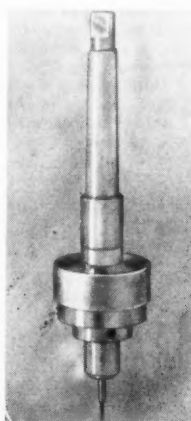
Send us samples of your small parts
... our Engineering Dept. will make tests
and submit recommendations and quotations

Write For FREE Illustrated Folder

SYNTRON CO.

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Homer City, Pa.



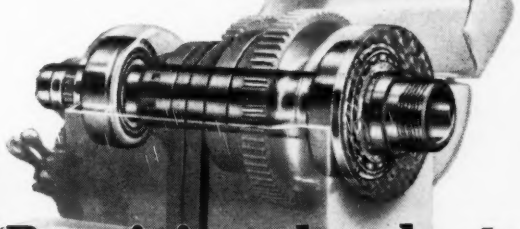
Winslow Super Sensitive Tapping Head

upward pressure reverses it. During the tapping operation, the tap can be cleared as necessary by the rapid reverse control. When tapping 0-80 or 1-72 holes, a special factory adjusted clutch prevents overloading the tap. For larger holes to 4-40, no special protection is required and this clutch is locked.

SHELDON

CHICAGO U.S.A.

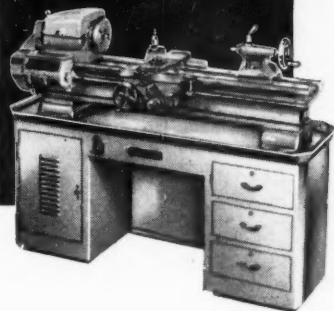
PRECISION LATHES



SHELDON

"Stamina" Features:

- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double-Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.



Precision that lasts

... "ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

Write for Catalog

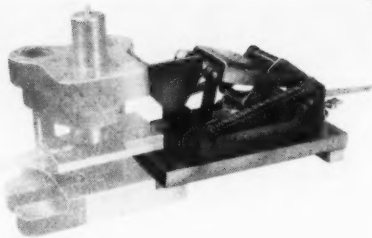
SHELDON MACHINE CO., INC.
4250 N. Knox Ave., Chicago 41, Illinois

Press Feed for Coiled Stock

An automatic hitch type press feed for mounting on the die set or bolster plate has been announced by Jaco Devices, Inc., 98 High St., Hingham, Mass. The unit is cam operated but does not rely on the cam to obtain or maintain accuracy of pitch.

As its name implies, the Jaco "Grip-O-Matic" Feed grips the stock firmly under spring pressure while being fed into the press tool; however, at a predetermined point before the die starts work on the material, its gripper releases and the stock is free to float in response to die pilots or metal flow requirement of forming operations. Slippage due to stock inertia is controlled and consequently accuracy of pitch can be maintained. On the return stroke, the gripper remains open, thus ensuring a minimum of wear on the gripper blade and freedom from surface scratches on stock with polished finish.

The Grip-O-Matic Feed is designed to operate from any side of the die set to which the cam is attached and is said to feed the stock on either the up or down stroke of the punch press ram. A ratio of 2:1 exists between the distance stock travels and the lateral movement of the



Jaco "Grip-O-Matic" Feed

cam roller; consequently, a feed length of 2 inches can be obtained on a punch press having only a 1-inch stroke. The unit is claimed to feed any thickness of coiled stock up to $\frac{3}{8}$ inch x 2 inches wide and transmit a maximum feed length of $2\frac{1}{2}$ inches from zero movement in an infinite number of pitches.

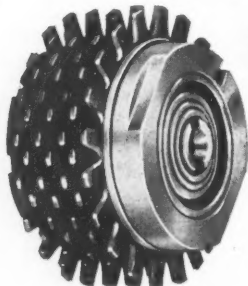
Heat-Treating Furnace for Small Tools

Waltz Furnace Co., Dept. D, 1901 Symmes St., Cincinnati, Ohio, has announced an improved heat-treating fur-

HANCHETT METCALF WHEEL DRESSERS

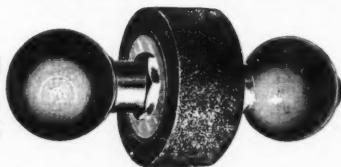
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Procunier Tapping attachments have established a reputation for outstanding performance in the tapping industry. They have helped increase output capacity, and have reduced maintenance, operating and spoilage costs to a minimum. Developed by practical craftsmen—who have concentrated exclusively on developing, improving and perfecting tappers for more than 30 years—Procunier tappers offer the rare combination of high speed, dependable accuracy, lasting endurance and economy of operation. Special exclusive construction features enable them to cut threads faster, for longer periods—with fewer spoiled pieces, fewer rejects. Here's why:

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3. Chuck spindle is supported at both ends assuring true operation—**avoiding tap wobble.**
4. **Aluminum housings** assure greater strength and rigidity with minimum weight—a vital factor for high speed tapping.
5. **PLUS** many other exclusive features.

WRITE TODAY for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 4

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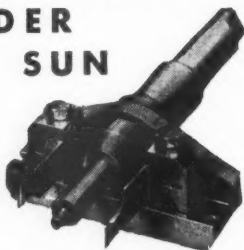


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Finished holes $1\frac{1}{2}$ " to $1\frac{3}{4}$ " diameter to a depth of 8" in one rapid operation on your present equipment with

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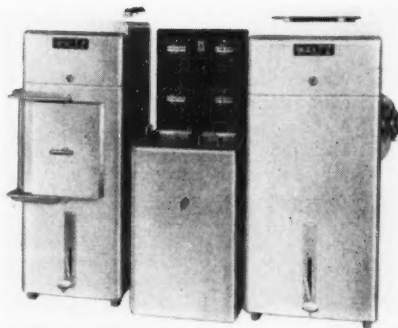
Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

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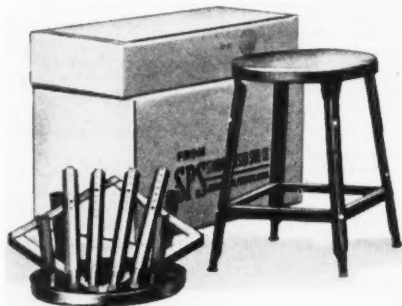
Waltz Small Tool Heat-Treating Furnace

nance for small tools. Said to provide a temperature range broad enough to permit the heat treatment of all high speed steels, even the cobalt type, the complete unit includes a preheat furnace, a drawing furnace, an atmosphere generator, and two quench tanks (one for oil and one for water). The drawing furnace is of the recirculating air type to permit close temperature control in the lower ranges.

Knock-Down Shop Stool Is Adjustable, Easy to Ship and Store

As an addition to the SPS Hollowell line of steel shop equipment, Standard Pressed Steel Co., Jenkintown, Pa., has announced a knock-down shop stool which is adjustable in three sizes to 15 positions and designed for economical

SPS Hollowell Knock-Down Shop Stool



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6 x 18
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DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS —
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FOR DEFENSE**

shipping and storage. The stool has a welded set assembly, double-angle leg construction for strength, and automatic nut-locking feature. One size is adjustable from 18 up to 22 inches, a second size from 23 to 27 inches, and the third size from 28 to 32 inches, all by 1-inch steps. The adjustments in each case can be easily made by means of four small bolts.

Shipped knocked down in a comparatively small carton, especially designed by SPS, the stool, which is finished in olive green, can be readily assembled with the aid of eight small bolts. The double-angle construction of the stool is

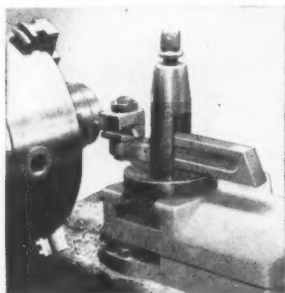
said to automatically keep the nuts tight on the bolts and the stool rigid. The steel seat, which is 14 inches in diameter, can be obtained with a Masonite top if desired. The stool is furnished equipped with pressed-in glides at the ends of the legs. If desired, rubber tips can be supplied for the stool, as well as a back which is adjustable for height and angle.

Magnetic Dial Indicator Holder Features Precision Adjustment

Designated as the Erick Magna Holder Model 200, a magnetic dial indicator

holder introduced by Cullen Mfg. Co., 1318 Clark St., Racine, Wis., features a precision adjusting device which controls the positioning of the dial holding rod, thus eliminating, it is claimed, any possibility of the spring tension in the rod lifting the indicator off the work after the rod and indicator are placed by hand. With the holder, the operator swings the holding rod and indicator to within $\frac{1}{2}$ inch or so of the work. Then, by turning a thumbscrew on the magnetic base of the holder, the operator can minutely adjust the indicator either against or away from the work without touching the rod or indicator.

According to the manufacturer, the Model 200 has a 45-50-lb. pull magnetic base and will adhere firmly to any metal that will hold a magnet. The magnets used are guaranteed lifetime Alnico types. The holder rod



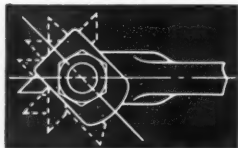
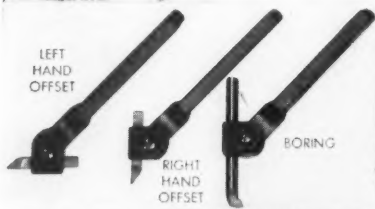
WALTON-AMERICAN Tool Holders

Hold with a perfect grip, tool bits, or boring bars in all sizes from $\frac{1}{8}$ " to $\frac{7}{16}$ ", square or round. Besides gripping the tool securely top and bottom, it is held so that no lateral motion is possible.

VERSATILE MULTI-POSITION

The Walton-Americans are adjustable to bit size, and to any cutting position. All changes may be made at the machine without additional heads or set screws.

One Walton-American can be used in straight and right or left hand offset positions, or any other position around an entire circle (see illustration). Economy is doubly assured for very short bits may be used, and jaws will not break high speed steel or Stellite bits.



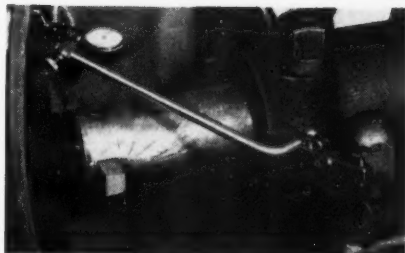
OTHER WALTON PRODUCTS — The well known *Walton Tap Extractor* for removing broken taps; and *Reps Pipe and Stud Extractor* for removing broken pipes, studs and screws (a product of Walton's affiliate, Reps Tool Company, Inc.).

Send for catalog of all Walton Tools.

THE WALTON COMPANY

DEPT. 10,

HARTFORD 10, CONNECTICUT



Erick Magna Holder Model 200 in use

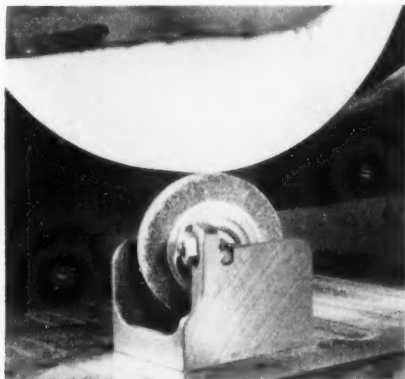
measures $6\frac{1}{2}$ inches long x $\frac{1}{4}$ inch in diameter and is made of non-magnetic stainless steel. It is set in a ball socket which permits universal settings and immediate readings. Adapter bushings are available for use with indicators having $\frac{1}{8}$ or $\frac{3}{16}$ -inch openings.

Emery Wheel Dresser Is Said to Eliminate Checks in Grinding Wheels

An emery wheel dresser which is said to trim any grinding wheel is now being marketed by L. Newman, 1001 24th St., Oakland 7, Calif. According to the manufacturer, the dresser requires no resetting or resharpener; provides for a maximum of grinding per trim; opens the bond and eliminates checks in grinding wheels; and also prolongs the life of a grinding wheel.

The dresser is available in two models, one of which is designed for surface grinding (illustrated). The other model

L. Newman Emery Wheel Dresser

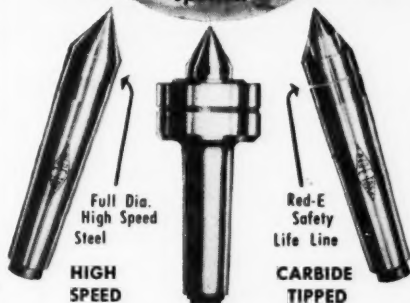


April, 1952

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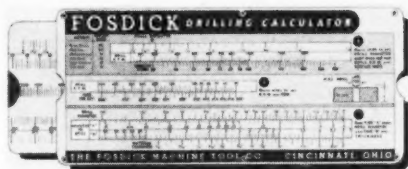
MODERN MACHINE SHOP 353

is intended for cylindrical grinding and is furnished with either a vertical or horizontal stand.

Drilling Calculator

As a contribution to the defense effort, The Fosdick Machine Tool Co., Cincinnati 23, Ohio, is distributing a "Drilling Calculator" from which it is possible to determine almost instantly the drill r.p.m. for any drill diameter to obtain a given surface speed and the time required to drill through a piece of work at a given feed.

The calculator is, in effect, a slide rule so made that when the slide is set to show a given drill diameter at a given



Fosdick Drilling Calculator

point, the number of r.p.m. required to obtain any given surface speed of a drill of that diameter can be read instantly. Again, by moving the slide to show a given r.p.m. over the figures indicating

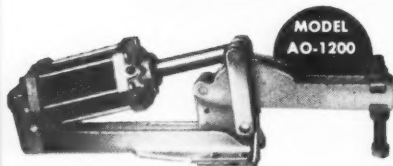
a given feed, the time required to drill through the thickness for any given drill diameter can be read direct from the calculator.

On the reverse side of the calculator, with the slide set to show the drill diameter under a setting number which is ascertained from a table (also on the calculator) of feeds from 0.005 to 0.030 inch for various kinds of materials, the amount of horsepower required to drive this drill at any given r.p.m. can be read direct from the calculator. In addition to the table of feeds for various materials, there is also a table showing the recommended surface speeds for the different classes of ferrous and non-ferrous metals.

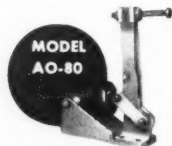
The calculator should be very valuable to anyone who has to estimate on drilling operations. One of these calculators is available without charge to any plant executive.

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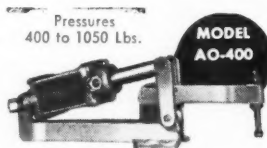
*Bring you more clamping efficiency
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Pressures
1200 to 2875 Lbs.



Pressures
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Pressures
400 to 1050 Lbs.



Pressures
200 to 475 Lbs.

- 1—in single installations where operator's fatigue is a factor or where the location of hand-operated clamps is impractical.
- 2—in multiple installations controlled by single valve.
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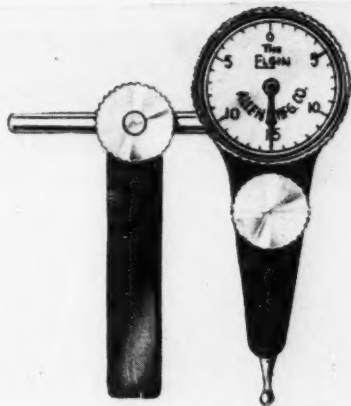
Western Division, 422 Magnolia St., Glendale, Calif.

Dial Indicator Combines Sensitivity with Ruggedness

The Elgin Dial Indicator now being marketed by Glore Industries, 2214 E. 75th St., Chicago 49, Ill., is said to combine unusual sensitivity with maximum possible ruggedness. The crystal is unbreakable and the shank is enclosed to minimize gumming up from abrasives and grease.

Other features of the indicator include an adjustable dial and a reversible action. The dial is calibrated in thousandths of an inch and has a range of plus or minus 0.015 inch. The actual movement of the tip is magnified 100 times in the travel of the needle so that a variation as small as 0.0002 inch is easily apparent.

A unique clamp on the back of the indicator is designed to accommodate rods from $\frac{1}{8}$ to $\frac{1}{2}$ inch on one side and up to $\frac{1}{4}$ inch on the other side. This wide range is said to enable the indicator to be fastened directly to the majority of height and surface gages and magnetic indicator holders. A rod is supplied which, in conjunction with the clamp enables the indicator to be locked into the chuck of a milling machine, and a rectangular bar is clamped onto the rod for use in the tool rest of a lathe.



Elgin Dial Indicator

A plastic storage case is supplied with the indicator. Two accessories are also available for use with the indicator. One accessory, the Micro-Hole Gage, is used for measuring hole diameters from $\frac{1}{4}$ to 4 inches. The other accessory, a deep hole gage, is used for measuring holes and slots up to 2 inches in depth.

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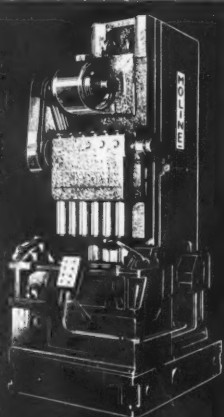
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SPECIALLY
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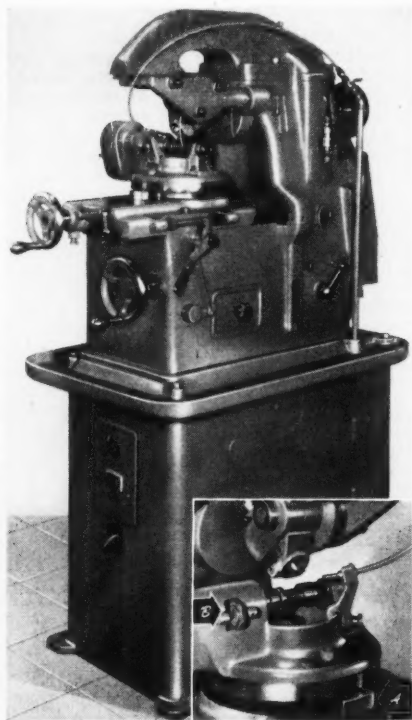
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DUCTION COSTS
FOR AMERICAN
INDUSTRY

**MOLINE
TOOL CO.**
MOLINE, ILLINOIS

DRILLING
BORING
HONING
TAPPING and
Special Machines

**Improved Gear Hobber Reduces
Set-Up Time**

The Hamilton Tool Co., 828 S. 9th., Hamilton, Ohio, has announced improvements in its Hamilton No. 1 Precision Gear Hobber, designed for the generation of spur, spiral, and crown gears, worms and worm gears, pinions, and gear segments. One improvement, shown



Hamilton Improved No. 1 Precision Gear
Hobber

at "A" in the accompanying illustration, is a vernier to measure minutes of the degrees on the turntable scale. The added ease with which accuracy is attained at this point is said to substantially reduce set-up time.

Another improvement, shown at "B", is a knurled thumb wheel which provides an accurate and rapid means of positioning the hob relative to the workpiece. This device also helps to speed setup, and provides the further advantage of greatly extending the periods of hob use

between sharpenings. Moreover, Ruthman Gusher pumps are now used on the hobber for the circulation of coolant, the coolant system being operated through controls independent from other working parts.

Also included as standard equipment on the Hamilton No. 1 Gear Hobber is a drawbar collet, operated by a handwheel which is said to greatly increase the productive capacity of the machine by reducing the time required for loading and unloading. An additional feature of the new spindle design is the adjustable spindle nose which is said to ensure trueness of the workpiece within 0.0001 inch and simplify the necessary adjustment for trueness when a change is made from collet to workholding fixture. The unique feature of independent selection of speed, feed, and indexing is said to be unaffected by the new spindle design of the machine.

Machine Chamfers Hypoid Pinions

Known as the "Burr-Master" and available in various models, a burring and chamfering machine for hypoid pinion teeth has been announced by Modern Industrial Engineering Co., 14230 Birwood,

Ave., Detroit 4, Mich. Shown in the accompanying illustration is the Model 2041, a three-station Burr-Master for simultaneous chamfering of as many as three different hypoid pinions of different dimensions—one in each station. The three stations are identical except for detail tooling assemblies and ratio of quickly accessible change gears.

Each station is independently operated. The operator merely places a hypoid pinion—shaft end down—into the opening provided and throws the drive lever to start the cycle. An oversize pinion will not drop in all the way. An undersize pinion or a pinion with the wrong number of teeth will not permit the automatic gaging device to start the cycle. Thus, the machine protects the operator against errors. As soon as the cutting cycle has been completed—a matter of only 4 seconds—the "cycle indicator light" goes on. The operator then pulls the release handle (located above and to the left of each station) and steps on the ejector pedal. Depressing this pedal while the machine is still running (before the cycle is completed) will not eject the part due to a safety interlock.

The high speed steel cutting tools used



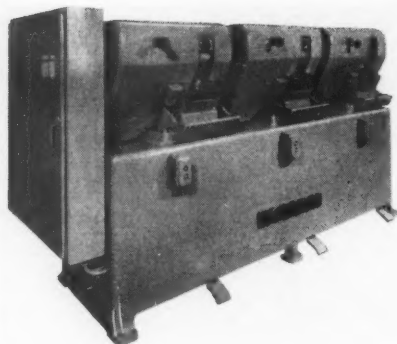
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THE CHICAGO SCREW COMPANY
2505 WASHINGTON BLVD. • BELLWOOD, ILL.



"Burr-Master" Model 2041 Burring and Chamfering Machine

are specially developed from tools of the dovetail type. Cutting is performed dry, eliminating the need for coolant. Depth of cut is readily adjustable for the single generating stroke required to burr and chamfer a tooth. Indexing of the pinion from tooth to tooth is automatically performed during the return stroke of the tools, thus permitting a rate of up to 5

cutting strokes per second. The index mechanism is a precision ball bearing type operating in a bath of oil. Lubrication of change gears, bearings, clutch parts, and other reciprocating movements is effected by a central lubricating system for ease of maintenance. All wear parts are hardened and ground, and anti-friction bearings are used throughout except on rocker arms. All electrical equipment is built to J. I. C. standards. Each station is provided with a built-in-chip disposal chute. Automatic chip disposal is available if required.

The Burr-Master for hypoid pinions is also available in single-station and twin-station types.

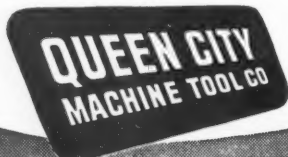
Dovetail Cutter Features Dual Thread Screw and Wedge Lock

The Viking Tool Co., Shelton, Conn., has added to its line of inserted tooth milling cutters an inserted tooth dovetail milling cutter featuring the Viking dual thread screw and wedge lock. The cutter body and blades have mating serrations to provide positive blade positioning and dual blade adjustment. The cutter is offered with either high speed steel, cast alloy, or carbide replaceable blades,

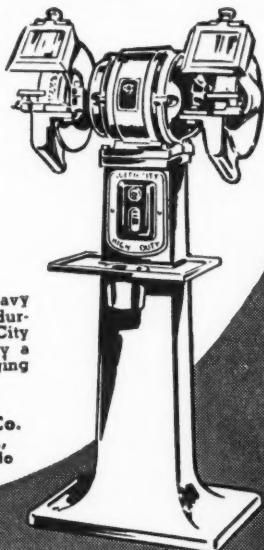


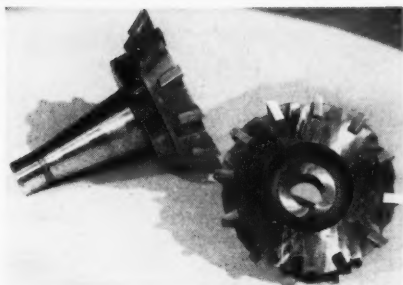
Cut grinding costs . . . with rugged QUEEN CITY Grinders

Queen City Grinders are built to stand up under the heavy work that pours through the shop daily. Noted for their durability, freedom from downtime and low cost, Queen City Grinders cut grinding costs to the bone. • Order today a battery of these low cost grinders and eliminate "ganging up" around one lone grinder.



QUEEN CITY
Machine Tool Co.
223 E. 2nd St.,
Cincinnati 2, Ohio





Viking Inserted Tooth Dovetail Milling Cutter

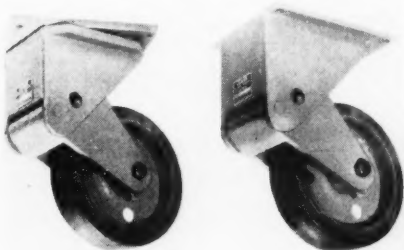
and in a shell or integral shank type. Cutter diameters range from 4 inches up, with the dovetail angle to meet user requirements.

Knee-Action Caster Provides Maximum Protection to Fragile Loads

All Steel Welded Truck Co., Rockford, Ill., has announced the addition of a knee-action caster to its line of materials handling equipment. Known as the Clark Duoflex, the caster is designed to provide maximum protection to fragile loads due to a 2-inch vertical wheel motion when obstructions are encountered.

The caster is available in both swivel and rigid types in wheel sizes from 6 to 20 inches in diameter. Rubber, Neoprene, steel, composition, zero-pressure, or pneumatic tires can be furnished for the caster, the weight capacity of which ranges from 90 to 1,660 lb. Heavier duty casters can be obtained on special order. Although the caster is standardly equipped with roller bearings, it also can be supplied with ball or tapered bearings on special order. With the Duoflex Casters, shimmy and "fish-tailing" are said to be eliminated.

Clark Duoflex Knee-Action Casters



April, 1952

ENGRAVING and MARKING

*The Green
Engraver*



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ROUTS,
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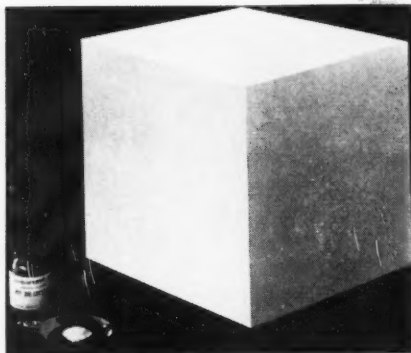
Green Instrument Co.

392 Putnam Avenue Cambridge, Mass.

Product Provides Rust-Proofing without Coatings

An economical method of preventing rust and corrosion of metal parts in the presence of air and moisture is said to be provided by "VPI" crystals, a slightly volatile amine nitrite now being made available by the Shell Oil Co., 50 W. 50th St., New York 20, N. Y. This volatile corrosion inhibitor is recommended for use in protecting metal parts, assemblies, instruments, and finished products during shipment, storage, and through various processing steps. Being slightly volatile at atmospheric temperatures, VPI gives off vapors which are carried by convection and diffusion to all surfaces of the metal, where they condense to provide a thin protective layer.

A powder-like substance, VPI can be applied by placing it in a package enclosing the parts to be protected as in an envelope containing ball bearing races); by blowing it into an area to be protected (as in the aircraft engines, where it is blown into spark plug holes, cylinder bores, and other ports); by putting it into a water or alcohol solution (as in the protection of metal parts during and between processing steps such as grinding); and by covering the metal parts in



A small quantity of VPI provides considerable corrosion resistance. For example, the one gram of VPI shown here is said to protect a cubic foot of metal surface, or parts, for up to one year when properly used with a barrier to prevent loss of vapor.

tote boxes. An unusual characteristic claimed for VPI is that it will arrest corrosion at any advanced stage.

Two types of VPI are available: VPI 220, which has greater vapor pressure



Manufactured and sold in Canada exclusively by Wickware-Stackbin, Ltd., Ottawa

Write Stackbin Corp., 1083 Main St., Pawtucket, R. I.

REDUCE HANDLING of Tools, Parts and Materials

Because Stackbins are portable containers — not fixtures — tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed — without disturbing any other bin. *Stackbins* — individual hopper-fronted stacking bins, slide like drawers in *Stackracks* — individual units which lock together to form racks of any size, shape or capacity.

**STACKBINS
IN
STACKRACKS**

STACKBIN

"Stacked and



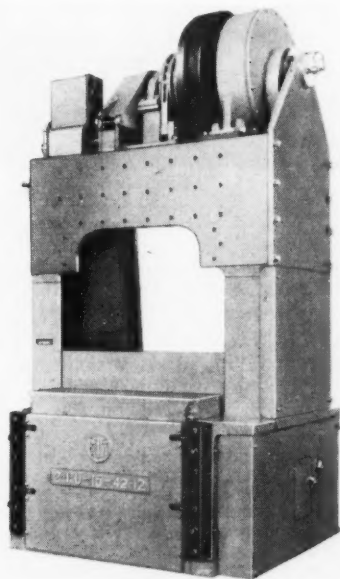
Still Accessible"

SYSTEM

but less stability at higher temperatures than VPI 260. In addition to the applications mentioned above, VPI crystals can also be used as inhibitors in hydraulic fluids and in water soluble paints to provide the corrosion resistance necessary in a general purpose industrial coating.

Gap-Type Press Is Designed for Use with Welding Fixtures

Development of a gap-frame welding press for use with welding fixtures in the mass production of spot-welded assem-

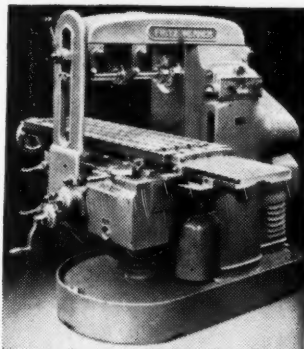


Bliss Gap-Type Welding Press

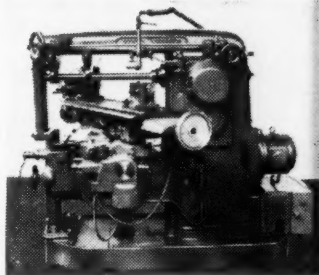
blies has been announced by E. W. Bliss Co., Canton, Ohio. The gap style frame permits conveyORIZED feeding from side to side, thus facilitating access to the work by operators. Work is accessible from either the front or back of the press.

The slide is located in the lower portion of the press and the work stroke is upward. Parts to be welded are laid on the lower "die," which contains welding tips, and moved up into contact with the fixed welding tips attached to the upper part of the press. The slide dwells in the upper position, holding the parts in contact with the electrodes until welding is completed.

now available

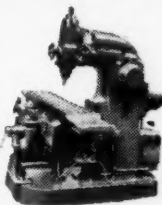


for early delivery



WERNER UNIVERSAL, VERTICAL & PLAIN Milling Machines

Manufactured by one of the largest machine tool manufacturers in Europe, these millers offer every feature you could desire for economical, perfect precision operation—plus reasonable delivery. In sizes 1, 2, 3, 4 and 5, universal, vertical and plain — also manufacturing types. Write today for complete illustrated brochure No. 9.



MARAC MACHINERY CORPORATION

1819 BROADWAY

NEW YORK 23, N. Y.

Circle 7-2048

The pneumatic friction clutch, flywheel, and motor are located at the top of the press for cleanliness and accessibility. The driveshaft is connected by a long eccentric rod to the slide actuating mechanism in the lower part of the press. The work stroke is adjustable, and the shut height is the same for all adjustments. The operating cycle is divided into thirds—120 degrees for upstroke, 120 degrees for dwell, and 120 degrees for downstroke. The machine can be started and stopped at any point in the cycle under load.

Slide widths on present models range from 42 to 84 inches, with 12-inch depth on all widths. Larger or smaller dimensions can be supplied to order.



**Now—
"JOB-
INDEXED"**
**marking
devices**

Ever notice how difficult it is—in the average catalog—to find **EXACTLY** the right kind of hand or machine marking device?

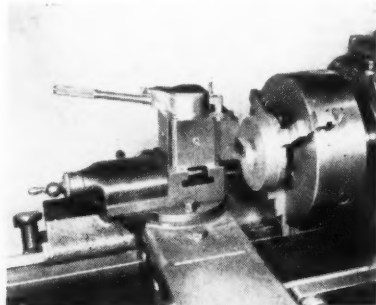
New Method's *new catalog* classifies them by the jobs they do... in easy-to-find fashion.

Get your copy. Ask for Catalog No. NM-51.

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit 7, U.S.A.

Tool Post and Toolholder Feature Unusual Rigidity

For use on engine lathes in performing a wide variety of operations, the "Marvic" Tool Post and Toolholder now being

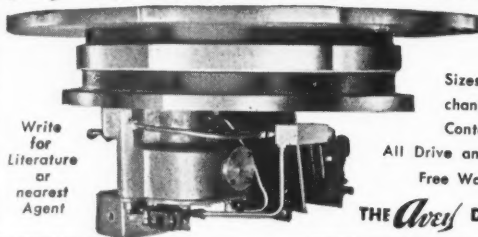


"Marvic" Tool Post and Toolholder set up for cutting-off operation

manufactured by Lebo Industries, Inc., 314 4th St., San Francisco 7, Calif., feature unusual rigidity and are said to be simple to operate. The tool post is designed for quick installation and is held firmly in place by means of a locking pin which allows for rapid adjustment of the tool post to the desired position. The tool post is multiple faced, allowing four positions.

Likewise designed for quick and easy installation, the toolholder permits the use of unusually large tool bits for maximum heat dissipation and includes a vertical adjustment screw that is said to make tool bit centering simple and eliminate shimmying. The toolholder is available in six types for threading tools, small boring bars, drilling tools, turning and facing tools, cutting-off tools, and large boring bars respectively.

Avey AUTOMATIC INDEX TABLE Meets Demand for DRILLING and TAPPING EQUIPMENT



Write
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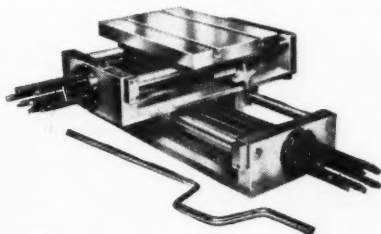
Sizes 16", 20", 24", 30", 36" Tables interchangeable. 4 to 18 Indexes. Entire Unit Self-Contained. Built on Unit Construction Principle.

All Drive and Control Mechanisms underneath Table for Free Work Surface • Easy Accessibility!

THE **Avey** Drilling Machine Co., Cincinnati 1, Ohio

Multi-Position Locating Device Permits Jig Boring or Milling without Jigs or Fixtures

Known as the "Speedi-Spacer," a multi-position locating device which is de-



"Speedi-Spacer" Multi-Position Locating Device

signed to provide for the quick and accurate location of parts for drilling, boring, or milling without the use of jigs or fixtures has been announced by Queen City Machine Tool Co., 223 E. Second St., Cincinnati 2, Ohio. Readily applicable to an upright drill, radial drill, jig borer, or boring mill, the device includes nine longitudinal and nine transverse positioning stop screws to provide for positive positioning. The hardened measuring pads upon which these screws bear are integral parts of the unit. Longitudinal and transverse movements are determined by the various settings of the screws; table position is maintained by positive locks.

The base plate of the unit includes ample space for mounting screw holes to fit any machine tool. The working surface is provided with two standard $\frac{3}{4}$ -inch T-slots. The thrust of drilling, as well as the weight of the part being machined, is accommodated on end grain Formica bearing blocks which operate on

ground steel ways. Since the Speedi-Spacer does not become a permanent part of the machine on which it is used, it can be quickly and easily moved to other machines as needed. The device requires no auxiliary equipment other than standard shop micrometers or vernier calipers.

Micrometer Is Said to be Accurate within 0.00005 Inch

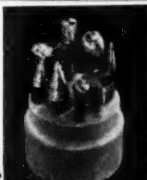
Karl A. Neise, Dept. MMS, 381 Fourth Ave., New York 16, N. Y., has announced the addition of the "Mastermike," a mi-

for fast... accurate...

keen-cutting files

specify

haskins



Set G-501

When you want the finest in hand-cut, ground or carbide cutters, specify Haskins. They give you many advantages over ordinary files—faster cutting, longer tool life and fewer resharpenings—advantages that mean reduced costs, reduced labor and lower over-all tool costs.

Pictured above, set G-501, available also in hand-cut set H-501. For additional shapes, send for complete catalog—R. G. Haskins Co., 2647 W. Harrison St., Chicago 12, Ill.



haskins
FLEXIBLE SHAFT EQUIPMENT

Avey AUTOMATIC UNITS for DRILLING • TAPPING

REAMING • HOLLOW MILLING and DEEP HOLE DRILLING

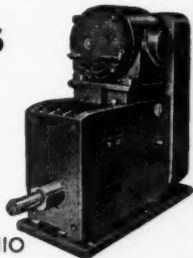
Vertical, Horizontal or Angular Mounting.

Made in two sizes . . . No. 1 & No. 2 Morse Taper.

Here's a packaged unit . . . that will simplify your

HIGH PRODUCTION PROBLEMS. Write for details.

THE Avey DRILLING MACHINE CO., CINCINNATI 1, OHIO





"Mastermike"

rometer for general shop and inspection use, to its line of imported German measuring instruments. The micrometer is claimed to be accurate within 0.00005 inch throughout its entire range.

Available in 0-1 and 1-2-inch sizes, the Mastermike is designed with a slightly oversize barrel, resulting in wide spacing of graduations and consequent ease and accuracy of reading. The dull chrome finish on the micrometer is said to be an additional factor for ease of reading.

Material Seals Gaps in Metal

A putty-like material for sealing wide seams and gaps in metal, glass, and non-

porous surfaces has been announced by Adhesives and Coatings Division, Minnesota Mining & Mfg. Co., Detroit 2, Mich. The sealer is described as a permanently soft, non-shrinking, moisture-proof, and weather-resistant synthetic resin material for sealing out dust, drafts, and moisture. It is designed for production-line application.

In the automotive industry, the material can be used to seal holes in the automobile firewall, to seal along the garnish molding and windshield center bar, and to seal body joints and openings around trim molding clips. It can also be used to seal around bolts and washers in fabricating steel units for auto bodies, and to cap holes where more fluid sealers might drip out. The material is a gray rubbery dough that is applied by putty knife or pressure or screw-type extruding equipment. Since it is not sticky to touch, it can also be rolled by hand into beads or globs and set in place.

The sealer, it is claimed, has excellent resistance to water and weathering; does not dry out or become brittle upon aging; and is unaffected by continuous service in temperatures up to 200 deg. Fahrenheit.

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

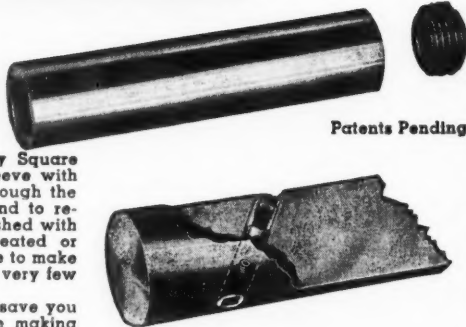
BUSHINGS MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE

23516 TELEGRAPH ROAD

DETROIT 19, MICH.

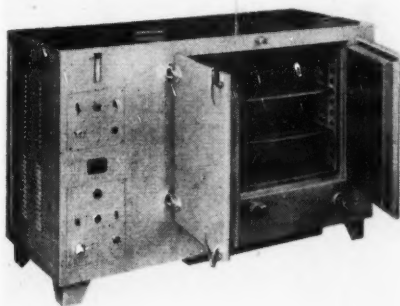


Patents Pending

Write for Literature

Convex Oven Provides Constant Air Weight Circulation

Designed to assure heat uniformity throughout and improve heat transfer between the heater bank and load in the



Blue M "Con-Wate" Mechanical Convex Oven

oven, the Blue M "Con-Wate" Mechanical Convex Oven illustrated herewith, product of Blue M Electric Co., 306-308 W. 69th St., Chicago 21, Ill., is said to provide a constant air weight circulation at all temperatures by the setting of a quadrant that allows definite quantitative control of the constant air weight circulation which, in turn, controls the velocity to any desired value. By the mere shifting of the control quadrant, the velocity is readily adjusted to any desired value from 50 to 350 f.p.m. equivalent.

Another feature of the oven is the Visi-Float which shows at all times the condition of air circulation in the heated chamber. A double-wall insulated stainless steel panel is provided directly above the Modella heater bank to eliminate radiant heat. A three-point suspension

motor-to-blower direct drive eliminates the need for belts, pulleys, and counter-shafting. To provide for maximum safety, the oven may be equipped with a "Packaged Protection" control panel by simply removing an auxiliary panel.

Available in three sizes, wired to meet National Electrical Code Specifications, the oven has a temperature range of from 35 to 288 degrees C. The interior of the oven consists of 18-8, 2B stainless steel; the exterior is heavy gauge steel, finished in gray Hammerloid enamel. The oven has two adjustable stainless steel shelves and a double-wall door.

Long
We all in a Lifetime

SECOMET

Diamond

WHEELS

cut faster
run cooler
and give
long life

J. K. SMIT & SONS
General Offices and Plant: Murray Hill, N. J.
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MICHIGAN • CANADA

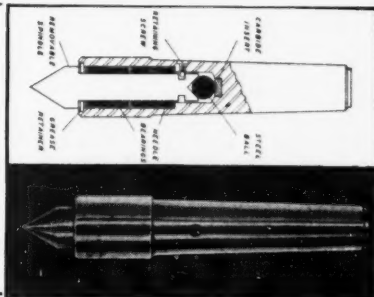
Less overhang — more working range

WEE LIVE CENTERS

Exclusive SMALL HEAD design of WEE Live Centers combines live center advantages with size and accuracy of dead centers. 30 to 40% less overhang means deeper cuts, faster speeds, no chatter. Used by hundreds of leading concerns. No. 2 M.T., \$21.00. Request complete price list.

Write direct, if distributor cannot supply you.

HERBERT CROSS & SON, Bala-Cynwyd, Pa.



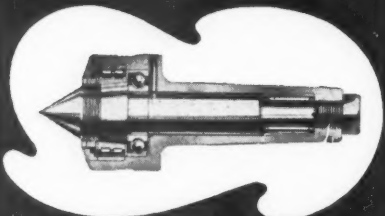
Machine Tender on Wheels

A machine tender which, because of its ease of handling, is said to provide unlimited usefulness around the factory or warehouse has been announced by Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. Designed to handle a variety of parts and small items, the unit is built of sheet steel and angle iron, which are welded together. A tubular handle is provided in the swivel end of the unit, which measures 30 inches long x 16 inches wide x 32 inches high overall. The top deck is 2 inches deep, and the



Palmer-Shile Machine Tender

NIELSEN Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog
M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

lower deck is 3 inches deep with turned edges all around.

The tender, which weighs approximately 65 lb., is furnished equipped with four 5 x 1-inch plain bearing wheels—two swivel wheels at the handle or rear end and two rigid wheels in front. It can also be equipped with four rubber-tired wheels.

Instrument Measures with Light Waves

For measuring with light waves, The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has announced a new monochromatic light with ten times the capacity of the previous model. The new Monolight is described as a self-contained

LUERS

PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured by

J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich.

Produced under License Issued by John Milton Luers Patents Inc.



DoAll Monolight

unit in a light, rigid, cast aluminum body, having a 5 x 5½-inch high intensity helium tube light source providing 53-foot candle power on the testing stage.

The standard stage is a 6¼ x 4¼-inch phenolic plate which, at additional cost, can be substituted by a granite surface plate lapped to within one wave band of true flatness. Sufficient storage space is provided under the hinged work stage for six 2-inch optical flats or three 3-inch or 4-inch flats. Storage space is also provided to house the 5-foot no-tangle extension cord.

The power supply is a 7500-volt transformer operating on 110-120-volt 60-cycle a.c. According to the manufacturer, the helium tube light source provides extremely accurate interference bands at 0.0000116-inch intervals and, when used with accurate optical flats, can be employed to measure size, flatness, and parallelism to within a few millionths of an inch. To inspect large areas or greater work heights, the head, or light source, may be turned 180 degrees, providing the operator a large free working area.

Other specifications of the instrument are as follows: weight, 30 lb.; height (closed), 9½ inches; width, 8 inches; length, 11¾ inches, maximum height (stage to light), 9 inches; maximum height (table to light), 16 inches. Available accessories include a complete range of gage blocks and optical flats (in both round and square shapes).

Drill More Holes Per Hour In ANY Pattern... On ANY Drill Press

Adjustable
with a **MULTI-DRILL**

Increase production up to 800%... save time, cut costs. MULTI-DRILLS make any drill press produce more. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility... wider application. Handles any hole pattern within 9" circle; centers close as ½". Extension Spindles available to increase working area to 22½". Special adaptations available.

**DRILLS ANY
HOLE PATTERN**



COMMANDER MFG. CO.

4224 W. Kinzie St.

Chicago 24, Illinois

Product of *Commander*... Builder of Production Tools



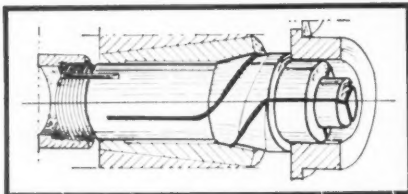
Drills 2
to 8 holes
at one
stroke

model
900

See your Commander Distributor for complete details. Write for the NEW Commander Full Line Catalog #851.

Simple Mandrel Expands Like a Collet

Known as the "Colletmandrel," a unique mandrel that is designed to simplify the holding of workpieces during



Cutaway view of Westberg "Colletmandrel" demonstrating the gripping of a ring for machining

machining operations is now being manufactured by The E. Westberg Corp., 800 Beley Ave., Syracuse 11, N. Y. Made in one piece, the mandrel is slotted to form three cantilever sections that deflect to positively engage the workpiece.

The Colletmandrel has one, two or three gripping diameters and is made in the standard C-5 collet sizes; diameter range from $\frac{7}{8}$ to $1\frac{1}{2}$ inches in $\frac{1}{8}$ -inch

steps. As the tapered part of the mandrel is tightened in the machine, the spiral segment is forced to deflect outward. In this manner, the gripping portion engages the inside diameter of the work. With a 10-degree taper, the total radial force exerted by each of the three gripping shoulders is about equal to the axial force on the mandrel. Three equally-spaced segments ensure concentricity.

"Specific" Standard Taps for Specific Materials

"Specific" taps, each specifically designed for a specific material, are now available as standard items from Detroit Tap & Tool Co., 415 Boulevard Bldg., Detroit 2, Mich. Each standard specific tap carries on the shank the designation of the specific material for which it has been engineered and produced, such as "steel," "cast iron," "aluminum," "zinc," "brass," or "plastic."

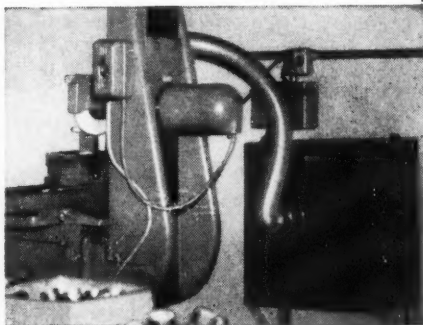
Specific taps labeled "steel" are intended for most steels and tough materials. "Cast iron" taps are specifically designed for the harder grades of cast iron commonly used today. Taps stamped "aluminum" are intended also for magnesium and other light metal alloys. Taps

STOP DUSTS *Instantly* with **DUSTKOP**

Available from stock of
22 standard models
300 cfm to 10,000 cfm

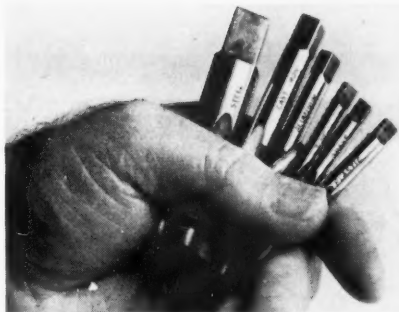
for: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.



AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.



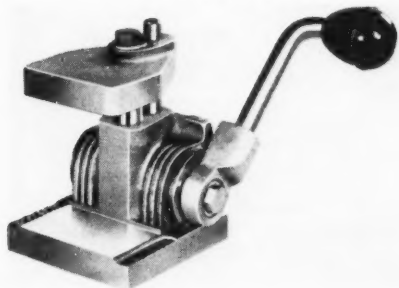
Detroit "Specific" Standard Taps

for "zinc" are to be used primarily for the tapping of die castings. Among the factors varied in the taps to make them specifically suited for specific materials are flute forms, chamfers, and method of heat treatment of the M-11 chrome-cobalt high speed steel used in Detroit taps.

Drill Jig Provides Infinite Number of Locking Positions

Designed as the Mijit B-6, a single-post drill jig now being offered by Esco Engineering Corp., 1940 E. Woodbridge, Detroit 7, Mich., is recommended for drilling small parts and for short and medium size runs. The jig provides an infinite number of locking positions due to its cam action. The base and top plate of the jig are accurately machined, as is the right angle of back to base for optional use in a side or lying-down position. Accurate alignment between bushing plate and base is maintained by means of a hardened and ground post and alignment dowel. The post also serves as a raising and lowering rack with a 1-inch stroke.

Esco Mijit B-6 Drill Jig



Turn Out More Work in Less Time with ... **BRADFORD TOOLS**

Speed Your Sanding Jobs!
Metalmaster "Kool Grip" Continuous
Duty Disc Sander



Most powerful portable 7" and 9" disc sanders now available. Makes quick work of *any* sanding job. Tool is balanced right for easy, accurate work. Powerful heavy-duty motor for continuous, duty use, with all grease sealed ball bearing. Net weight 7"—14 1/4 lbs.; 9"—15 lbs.



**JUST TWO WEEKS DELIVERY
ON THESE TWO
BRADFORD TOOLS!**

**Put Holes Where
You Want 'Em
Fast! Easy!**



Model 22 Palm Drill

Here's *two-fisted* drilling power in *one* hand! Can't be beat for close-quarters drilling. Light, powerful, compact. Drills 1/2" in steel; 1/2" in hardwood. All ball bearing. Comfort-fit pistol grip. Standard 110-volt AC-DC motor; available in other voltages. Equipped with 3-jaw chuck, key and patented key holder.

Get the tools that do the job—faster—better—at less cost. Specify Bradford Tools. See your Bradford dealer or write for complete information.

THE BRADFORD MACHINE TOOL CO.
658 Evans St. Cincinnati, Ohio
Manufacturer's Agents Wanted—
Good Territories

Metal Parts Washer Provides Active Wash Action

Product of Super-Soak Co., 3770 S. Pennsylvania Ave., Milwaukee 7, Wis., the Super-Soak Metal Parts Washer illustrated herewith is described as a simple, automatic, active soaking type unit which includes a tray that provides a "swishing" and positive cleaning action. The design comprises a heavily constructed steel plate tank (cover attached) equipped with a $\frac{1}{4}$ h.p. single-phase electric

motor operating a simple gear-drive mechanism attached to the loading tray. The mechanism is arranged to automatically and slowly lower and raise the



Super-Soak Metal Parts Washer

F
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A
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Vi-Speed
AIR-POWERED

**FAST
RUGGED**

- HOLDING
- PRESSING
- PUNCHING
- SIMPLE DESIGN
- 8 MODELS
- Guaranteed

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VAN PRODUCTS CO.
3734-51 W. 12th Street
Erie, Penna.

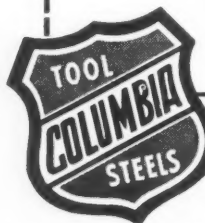
Columbia

TOOL STEELS for
all tools for all purposes

DIE STEELS

Superdie Atmodie Oildie
Exl-Die EZ-Die

**COLUMBIA TOOL
STEEL COMPANY**



Main Office & Works
Chicago Heights 6, Ill.

tray into and out of the soaking solution, which can be used either cold or hot.

According to the manufacturer, this slow dunking action combines two positive cleaning methods — a "chemical" action during the soak in the solution and a "swishing" and washing action as the loading tray slowly operates into the solution. This combined action is said to loosen and then remove grease, dirt, oil, scum, and other foreign materials. Aggravation of the sludge on the bottom of the tank is said to be eliminated since the tray stops within 3 inches of the bottom.

Revolving Stop for B&S Automatic Screw Machines

Designed to prevent the mutilating of stock and bar ends, a ball bearing revol-

DON'T TAKE CHANCES!

Specify ACE

DRILL BUSHINGS

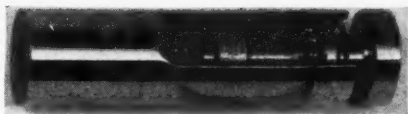
ACCURACY — Guaranteed by triple inspection plus light wave control.

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ACE DRILL BUSHING CO., INC.

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"Mac" Revolving Stop

ing stop for Brown & Sharpe automatic screw machines is now being marketed under the trade name of "Mac" by The Whitfield Mfg. Co., 402 Oakland Ave., Washington C. H., Ohio. The stop is made in three sizes of 1, $\frac{3}{4}$, and $\frac{5}{8}$ inch outside diameter.

Low Temperature Brazing Flux for Titanium

Known as Special Handy Flux for Titanium, a special brazing flux for use in the joining of titanium and zirconium and their alloys has been developed by Handy & Harman, 82 Fulton St., New York 38, N. Y. Silver brazing alloys are said to readily wet the titanium which is protected by the flux.

Used with Easy-Flo low temperature brazing alloys, the flux is claimed to allow for the rapid heating of titanium

and zirconium, limiting the time at brazing temperature so that embrittlement is minimized. The low temperature possible with these brazing materials is also claimed to minimize oxygen and nitrogen contamination of the titanium. Tensile strengths of 45,000 to 50,000 p. s. i. are said to be obtained with butt joints in commercially pure titanium. Heating may be accomplished with either oxy-acetylene torch or furnace; ordinary brazing technique is used.

Special Handy Flux for Titanium is made from reagent grade chemicals and is available in $\frac{1}{2}$ -lb. jars.

Matrix Prolongs Diamond Tool Life

Precision Diamond Tool Co., Elgin, Ill., has introduced a new P. S. M. Matrix, compounded to prolong the life of diamond tools. According to the manufacturer, the coefficient of expansion of the matrix equals that of diamonds up to a temperature of 340 deg. F., thus, the matrix does not pull away from the diamonds while it is dressing, thereby preventing the diamond from becoming loose in the matrix so that vibration and excessive wear of the diamond are eliminated.

Another important characteristic claimed for the P. S. M. Matrix is that it

Finished PIPE NOTCHING IN 5 SECONDS OR LESS

ARC-FIT actually notches out pipe or tube ends in less than 5 seconds to give you snug-fitting "T" or angle joints, ready for welding or brazing, without deformation or any extra finishing.

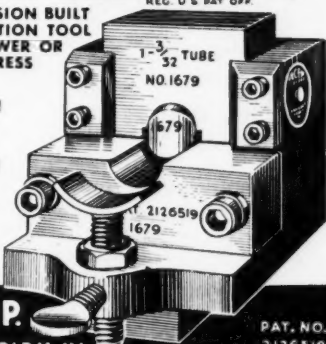
Standard ARC-FITS for "T" joints using single size standard pipe from $\frac{3}{4}$ " to 2" shipped promptly from stock.

Special ARC-FITS for larger sizes or angular cuts supplied to your specifications . . . Quick-interchangeable punches and dies also available. Send us drawing of joint and material specifications for quotation and full information.

ARC-FIT IS PRICED SO THAT EVEN THE SMALLEST SHOP CAN AFFORD IT

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A PRECISION BUILT
PRODUCTION TOOL
FOR POWER OR
HAND PRESS



Vogel TOOL & DIE CORP.
1823 N. 32nd AVE., MELROSE PARK, ILL.

PAT. NO.
2126519

actually wets the diamond, welding the diamond firmly in place and preventing it from being pulled out. The manufacturer further claims that the hardness (80 Rockwell on the B scale) of the P. S. M. Matrix is of such a consistency that it is soft enough not to load or damage the grinding wheel, should it ever come in contact with the matrix, and yet tough enough to protect the diamond from unusual hard usage.

Shelf Truck Useful for Stock or Tools

A shelf truck which is said to be particularly useful for the fast movement of stock or tools is now being supplied by Bay Metal Products, 3015 N. 16th St., Philadelphia 32, Pa. The truck measures 36½ inches high, including casters.

The shelves are made of 14 gauge steel with 2-inch flanges, and the legs are made of 1½ x 1½ x ¼-inch angle iron. Each shelf is attached to the legs by 16 bolts and lock nuts, providing unusual rigidity to the assembly. The bottom shelf is fixed with the flange turned up; other shelves are reversible.

The truck is furnished with two 5-inch rigid casters and two 5-inch swivel casters, either rubber or steel. The unit is pro-



Bay Shelf Truck

vided with a baked green finish and is shipped knocked down.

Make A Clean Impression!

HAND-CUT

STEEL STAMPS Letters & Figures



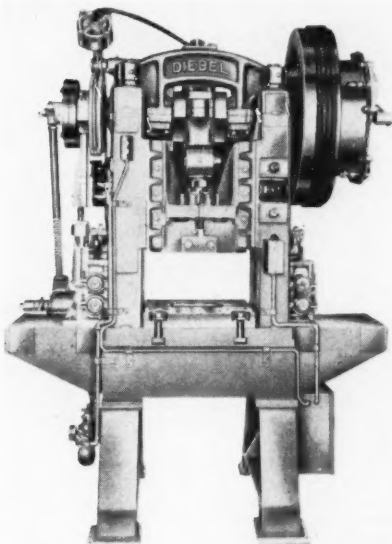
Deep, hand-cut letters in special-formula steel assure clean impressions and long service. Face of stamp is angled for extra strength. Chamfered corners for locating the base. Ask for Hoggson Brand at mill supply houses.



HOGGSON & PETTIS MFG. CO., New Haven, Conn.

High Production Stamping Press Is Fully Automatic

Product of Di Machine Corp., 2714 W. Irving Park Rd., Chicago 18, Ill., the Di-Matic Hi-Production Press illustrated herewith is fully automatic and is designed to provide for accuracy of alignment and speed of operation in precision stamping. The press, which has a 40-ton capacity, is said to produce intricate piece parts from the most complicated



Diebel "Di-Matic" Hi-Production Press

progressive dies due to its unusual rigidity which assures long die life.

Outstanding features of the press include four main crankshaft bronze bearings which are claimed to assure long press life. In addition, the press features an air-operated and electrically-controlled friction clutch and brake; air ejector and cam; metered lubricating system; cylindrical slide 16 inches in diameter guided by adjustable retainers with 380 square inches of contact area; knock-out bar for compound dies; built-in scrap cutter; 5 h.p. vari-drive motor unit; air clamped roll feed (driven by rack and pinion) with Formsprag over-running clutch equipped with double ball bearings; and specially designed spring and rubber shock mounts. Provision is made in the electrical control circuit for the use of a safety shutoff device.

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work clamps
Now in two Sizes!



Set-ups stay put when Lockjaw grips with both downwards and sideways pressure . . . grip is sure, powerful, self-locking . . . eliminates cumbersome bolting and clamping . . . saves time and work spoilage. Use Lockjaw on planers, radial drills, shapers, milling machines, surface grinders, boring mills and lathes.

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Brighton 36, Boston, Mass.

Dept. MMSA-4

For More Precision Work

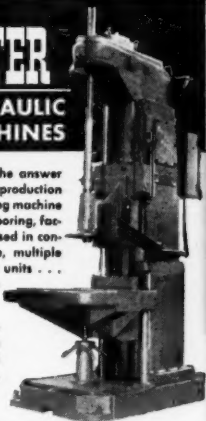
RELY ON RIVETT, The Master Craftsman's Master Tools

DRILLMASTER VERTICAL HYDRAULIC DRILLING MACHINES

The DRILLMASTER provides the answer to a multitude of modern production problems. This precision drilling machine is ideal for drilling, reaming, boring, facing, and tapping . . . when used in conjunction with indexing table, multiple drilling heads and auxiliary units . . . many time consuming operations can be combined.

DRILLMASTER vertical hydraulic drilling machines are available in five models, 5 h.p., 7½ h.p., 10 h.p., 25 h.p., and 50 h.p.

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BRANCH OFFICE—LEASIDE, ONT.

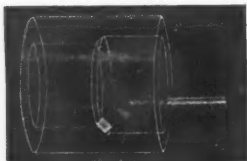
U.S.A. Sales Representatives, Arnold J. Warner Co., New Center Bldg., Detroit 2, Mich.

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WITH EXTRA ADVANTAGES!

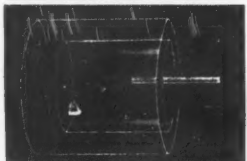
- REPLACEABLE TIPS AND SOLID TYPES
- IN FOUR FORMS
- FULL RANGE OF SIZES

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Made of Super-High-Speed steel or
carbide tipped.

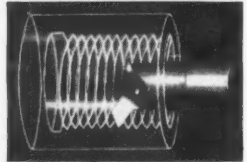


ALL STYLES

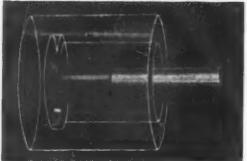
for general
boring



for bottoming
and facing



for internal
threading

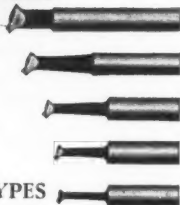


for recessing



for boring holes
of $\frac{1}{8}$ " min.
diameter.

SOLID TYPES



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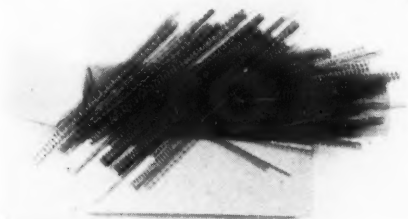
R. B. TOOL CO., Inc.

Dept. MS, 41 East Hartsdale Ave.
Hartsdale, New York

Inquiries from Agents Invited

Compression Spring Assortments

Two new compression spring assortments have been introduced by Reid Tool Supply Co., 709 Baker St., Muskegon



Reid Compression Spring Assortment

Heights, Mich. The large assortment consists of 60 springs, two each of 30 different sizes, and the small assortment consists of 30 springs, two each of 15 different sizes. The springs, which are made of music wire, range in diameter from $\frac{3}{32}$ to $\frac{1}{2}$ inch and are available in 10-inch lengths.

Soldering Cream Increases Activity of Flux

Farrelloy Co., 1235 N. 26th St., Philadelphia 21, Pa., is now marketing, under the name Fargail, a soldering cream which is said to increase the activity of a flux without the use of mineral acids while definitely protecting the metal soldered from corrosive attack of the active ingredients. With the cream, metals such as phosphor bronze and Nichrome may be soldered as readily as tinned steel, galvanized iron, copper, brass, and so on.

According to the manufacturer, Fargail Soldering Cream gives off no toxic fumes and is safe to use under any conditions.

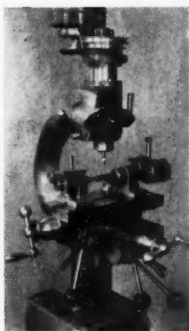


(Above) Wire tinned with Fargail Soldering Cream using low tin solder. (Below) Wire tinned with ordinary paste using low tin solder

Buffered to reduce corrosion, the cream, it is claimed, may be used in all operations where soldering paste is indicated. Conductivity of the cream on electrical equipment is said to be nil. Also said to be highly effective for sweating copper fittings, the cream is supplied in $\frac{1}{2}$ lb. cans.

Precision Miller Is Fully Universal

The Nothelfer Micro-Milling Machine now being distributed by Eric R. Bachmann, 27-11 A3, 41st St., Long Island City 1, N. Y., is described as a fully universal high precision milling machine which is said to be particularly



Nothelfer Micro-Milling Machine

useful for producing intricate instrument parts. A protractor shaped half-circle with a dovetail cross-section guides the milling head unit with motor, step pulleys, and milling spindle around a 90-degree arc. The milling head unit can be locked on the protractor guides in any desired position from vertical to horizontal.

The machine is equipped with a $3\frac{1}{2}$ x 8 $\frac{1}{2}$ -inch table which is movable in three directions by either a feed screw and crank or by quick-action levers; the change-over from one type of feed to the other can be effected instantly. Provided with spindle speeds up to approximately 4,000 r. p. m., the unit is claimed to be equally well suited as a universal milling machine, drill press, grinding machine, or small precision lathe. The machine is furnished complete with a cast iron pedestal to allow easy access from all sides.

this **PRACTICE**
MAKES *for*
PERFECT
welds

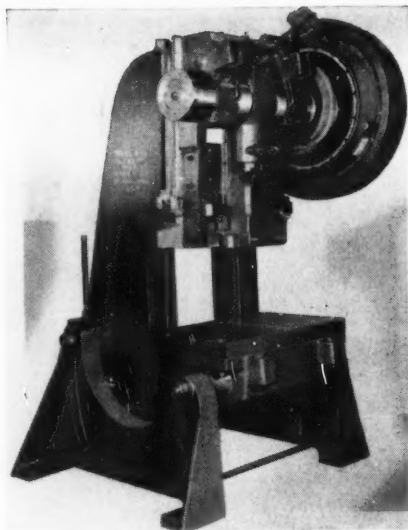
Make it a practice to use Protect-O-Metal before welding—and get easy-to-clean, tough, more perfect welds everytime! P.O.M. cuts out spatter adhesion, improves fluxing, stabilizes the welding arc, saves 85% of weld cleaning time and labor—all for about 1/10¢ per foot of weld. P.O.M. No. 2, water soluble, goes on fast and welding can start *at once*. No fumes, no trouble. P.O.M. No. 8 dries hard in less than an hour, protects from rust and corrosion for months, and is a good paint primer. Spatter wipes off either in a flash! With P.O.M. and a little practice even amateurs can make more perfect welds. Order a trial gallon today.



G. W. SMITH & SONS, INC., 5407 Kemp Road, Dayton, O.

60-Ton Power Press Has Special Alloy Frame to Ensure Rigidity

Sales Service Machine Tool Co., 2355 University Ave., St., Paul 4, Minn., has announced the Press-Rite Model 60 Open-Back Inclinable Power Press illustrated herewith, which features a one-piece, heavy duty, special alloy frame with built-in tie rods that is said to reduce binding or misaligning of dies on extra heavy drawing and blanking operations. This 60-ton press also includes the Press-Rite Airflex clutch and brake system;



Press-Rite Model 60 Open-Back Inclinable Power Press



CLEAN, DRY AIR
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MURPHY SEPARATORS
AND AFTERCOOLERS

Murphy type A & B separators take out and eject all moisture automatically. Also many styles of Murphy aftercoolers for air as low as 30 CFAPM up to 15,000 CFAPM.

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GRAY TURRET HEAD METAL CUTTER OR NIBBLER

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Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO.
Box 596, Philadelphia, Pa.

anti-friction roller bearings in the flywheel; non-repeat single-stroke mechanism; and many other features. It is available in standard flywheel drive and back-geared types.

The ram slide is extra heavy, with large and long ramways. Triple lubricated and counterbalanced, the slide includes a steel bushed hole for holding die shanks, as well as a ball and socket adjusting screw with easy adjusting take-up retaining ring. The bolster area of the press is 21 x 32 inches, and the depth of throat is 11 inches. The shut heights and strokes are optional.

BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.



Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc.

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BOSTON 31, MASS.

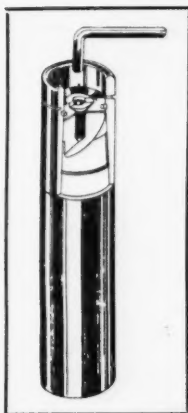
Guide Pin Eliminates Punch Holder Binding in Separating Die Sets

A removal cap guide pin which is designed to eliminate punch holder binding in separating two and four-post die sets has been announced by Superior Steel Products Corp., 2754 S. 19th St., Milwaukee 15, Wis. With the guide pin, the punch holder, it is claimed, is readily freed on the uppermost part of the pin where it is most apt to tilt and bind. Removal of the detachable cap allows for maximum freedom of movement at this critical point, thereby increasing the speed of overall assembly and disassembly operations.

The cap is removed from the guide pin by loosening a socket head screw, which rotates in a collar and serves as a jack for the cap, thus assuring positive separation from the guide pin proper. The guide pin is hardened and ground to plus 0.0005 inch and minus 0.0000 inch to ensure maximum matching accuracy of the punch and die and to maintain constant alignment of these parts during use. A O-degree taper seat is ground on the upper part of the pin to accommodate the removable cap, and a hole is drilled and tapped in the top of the pin for the socket head jackscrew. A matching O-degree in-

ternal taper is ground in the removable cap so that it can be readily assembled to the pin.

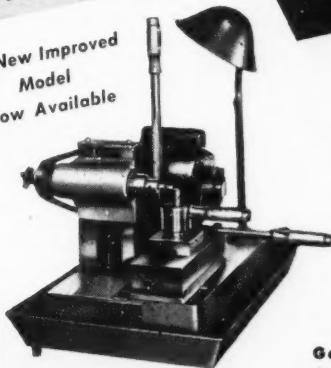
An additional feature in the structure of the guide pin provides for replacement of the cap only when the pin becomes worn due to long press runs. A deep recess is machined into the top of the guide pin cap to form an oil reservoir. Suitable openings are provided through the cap wall to the outer bearing surface, and oil flows through these openings to lubricate the guide pin and guide pin bushing. The guide pin is available on all new die sets manufactured by the company and can also be adapted to sets now in use.



Cutaway view of Superior Removable Cap Guide Pin

**SIMPLE TOOLING CHANGES
CONVERT SET-UP TO
LATHE, MILL or GRINDER**

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A versatile bench-type machine for small parts manufacture, combination or straight-line operation. 1" ball-bearing spindle, 825 and 3450 rpm., standard speeds (full range optional) 1/3 hp., 1725 rpm. motor.

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VIKING INDUSTRIES

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End Mills and Diesinking Cutters Are Offered in Wide Range of Styles

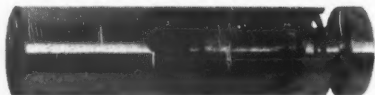
A complete line of end mills and diesinking cutters processed from high quality, high speed tool steel and carefully heat treated to provide for maximum cutting life has been introduced by The Metal Removal Co., 1546 N. Orleans St., Chicago, Ill. The end mills and diesinking cutters are available in a wide range of standard sizes in single and



M-R End Mills and Diesinking Cutters

double-end types of small and large diameters and with two, three, or four flutes (straight or spiral) and straight or ball ends.

THE MAC REVOLVING STOP



A new, economical ball bearing revolving stop for Brown & Sharpe Automatic Screw Machines. Eliminates mutilating stock and bar ends. Try one and be convinced. Made in three sizes:

1" OD. — 3/4" OD. — 3/8" OD.

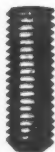
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402 Oakland Ave. Washington C. H., Ohio

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Socket
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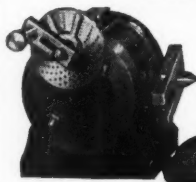
**ECONOMY
MACHINE PRODUCTS
COMPANY**

5212 Lawrence Ave., Chicago 30, Ill.

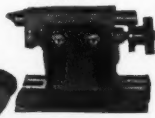
Forced Feed Now Feature of Kling "Combination" Machines

According to an announcement made by Kling Bros. Engineering Works, 1328 N. Kostner Ave., Chicago 51, Ill., all Kling Combination Shear, Punch and Coper Machines equipped with one-shot lubrication will now be automatically lubricated by forced feed. This feature is the latest of many features incorporated in these versatile machines, which are designed to perform shearing, punching, notching, slitting, and coping operations of all kinds. Descriptive bulletins regarding these machines are available from the manufacturer.

.....CARROLL..... DIVIDING HEADS



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3 SIZES — 4 MODELS — 6" to 12"

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave., Cincinnati 9, Ohio

Hand Screw Machine Has 1 7/16-Inch Tapered Spindle

The Globe Model C Hand Screw Machine illustrated herewith, product of Globe Heat-Seal, Inc., Machine Tool Division, 3384 Robertson Blvd., Los Angeles 34, Calif., is a high speed, high precision machine designed primarily for secondary operations. The large spindle of 1 7/16-inch inside diameter is precision ground to a No. 5 Morse taper, providing maximum collet capacities of 1 inch for bar type and 1 3/4 inches for spindle nose type collet chucks. The machine is equipped with large precision tapered roller bearings which are sealed in the head, and includes a 40 1/4-inch streamline bed, cast in one piece of high chrome content iron. Bed ways are 6 inches wide and are hardened and ground for maximum accuracy. All castings are normalized to prevent warpage. The length of the bed to the headstock is 31 1/2 inches, and the length of the working area from the nose of the spindle to the face of the self-indexing hex head bed turret is 18 3/4 inches.

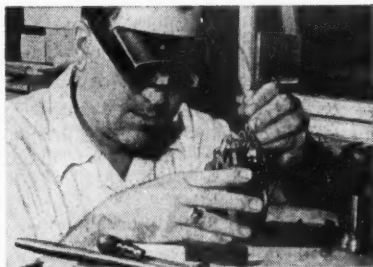
The machine is driven through a four-position quick-change gearbox employing dual V-belts running to two step-cone pulleys. By means of a motor located in the



Globe Model C Hand Screw Machine

base of the pedestal, eight spindle speeds are available without belt change and 16 speeds with only one belt change. Speeds range from 184 to 3,796 r.p.m.

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In the General Electric Plant
Magni-Focuser helps a worker make adjustments on precision equipment.

MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

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SPEEDS PRODUCTION
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

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EDROY PRODUCTS CO. 480 Lexington Ave.,
Dept. P, New York 17, N. Y.

Highlights of Papers Presented at ASTE Technical Sessions

ACCURATE control of hardness of materials for military equipment is now such an important factor that hardness checks have become production line, instead of "laboratory", operations, according to Vincent E. Lysaght, Wilson Mechanical Instrument Division of American Chain & Cable Company, Inc., New York City. According to Lysaght, most production line hardness testing setups have to meet stringent specifications for military equipment. Typical parts on which these checks must be made include armor piercing shells, brass and steel shell cases, and tank, aircraft and rifle parts.

Another military component on which precise hardness checks must be made are jet engine blades. Each blade is checked in at least two places, Lysaght said. Women workers have been used successfully in hardness testing operations by jet engine manufacturers, he added.

Hardness testing methods that will check the hardness of materials as thin as five ten-thousandths of an inch were described by Lysaght. One of the problems in hardness testing, he emphasized, is the supporting of the parts during tests. He said that an error in checking depth of only eight one-hundred-thousandths of an inch would give incorrect measurements.

In many cases industry has had to resort to sampling checks for hardness testing instead of 100 per cent checks. Stringent accuracy required in hardness testing is affected considerably by worker fatigue. Random

sampling has often proven to be the best method, Lysaght said.

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Industry Standards Speed Production Programs, Eliminate Scrap

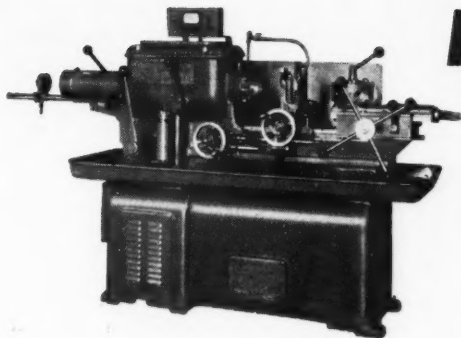
INDUSTRY standards programs developed through the cooperative efforts of tool engineer manufacturing experts and product designers can speed production programs and eliminate scrap, it was pointed out by Dr. John Gaillard, American Standards Association, New York City. Gaillard said that such programs also promote complete interchangeability of parts and avoid selection fitting.

If established correctly, he said, they assure that parts designed by product designers can be put into production with positive knowledge that they can be mass produced with minimum initial production difficulties. Decentralization of job responsibilities in modern mass production industries has pinpointed the need for such standards programs, Gaillard said. He pointed out that standards programs bring together the knowledge of the partners in industrial production—the product designer and the tool engineer.

— o —

Unique "Pinball" Machine Checks Accuracy of Inspection Methods

USE of a "pinball machine" to check the accuracy of production inspection sampling methods was revealed by Dr. James V. Strela, Staff Statistician for Thompson Products, Inc., Cleveland, Ohio, who told produc-



HERE IT IS!

The new Simmons No. 2 Turret Lathe, offered to you with three distinct advantages:

- Low Cost
- High Precision
- Early Delivery

Plain or Back-Geared — Forged steel spindle with anti-friction precision bearings, friction clutch and brake. Spindle nose, $2\frac{3}{8}$ "-8.

$1\frac{1}{4}$ " bar capacity—14" swing over ways. Micro-Speed Drive offers infinite speeds — plain, 375 to 1500 RPM; back-geared, 44 to 750 RPM — for bar or chucking work. Power feed to turret.

Write today for complete details.

SIMMONS MACHINE TOOL CORPORATION

1745 North Broadway, Albany 1, N. Y.

N. Y. Office: 50 East 42nd St.



Sensitive Universal BENCH RADIAL DRILL

$\frac{1}{2}$ " Drill, cap. speeds up to 3600 RPM

Dist. Spindle to column—21"

Dist. chuck to base—16 $\frac{1}{2}$ "

Precision Spindle, Ball Bearing Mounted

Rugged Construction, Weight 500 lbs.

Complete Spare Parts Inventory

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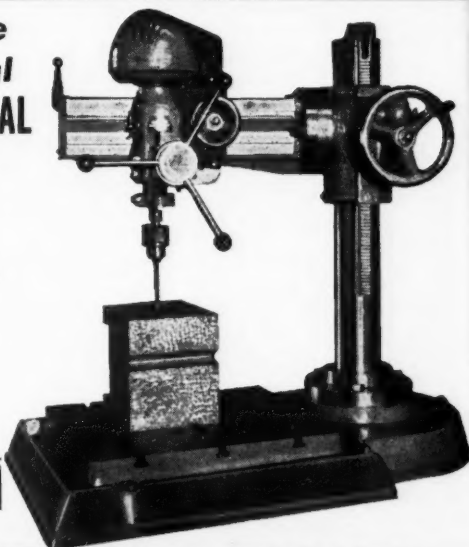
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CAPITOL MACHINERY CORP.

197-199 MOTT ST.

Phone WOrth 4-7615

NEW YORK 12, N. Y.



tion experts at the meeting that the special "pinball" machine has the same variables as production operations: The machine, the material (represented by steel balls) and the operator (represented by an electric motor drive).

The pinball machine has a bin of steel balls above a motor-driven wheel. The latter feeds one ball at a time into 21 rows of pins. Under the pins are 39 channels into which the balls fall by chance. The balls can pile up in any

of the channels and thereby give a visual picture or "score" of the accuracy to be expected when varying quantities of samples are checked.

"Tilting" of the pinball machine, called the "Quincunx" by Dr. Strela, gives results identical with those obtained in production machining operations where something has gone wrong. In his talk, entitled "Statistical Evaluation of Rational and Stratified Methods of Sampling," Strela said that the pinball machine proved that mathe-

matical analyses were usually 99.73 per cent correct.

— 0 —

Low Cost Gages In Large Demand For Military Pro- duction Programs

LOW cost gages of standard types are now in tremendous demand for our current rearmament program, according to William H. Gourlie, Standards Engineer at The Sheffield Corporation, Dayton, Ohio. Gourlie said that the need for conventional manual gages has not been eliminated by the latest designs of automatic, mechanical, electrical and air gaging equipment which now make direct measurements and show when machine

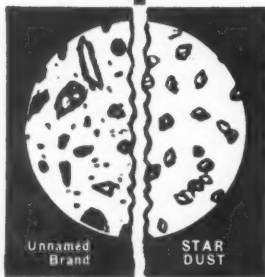
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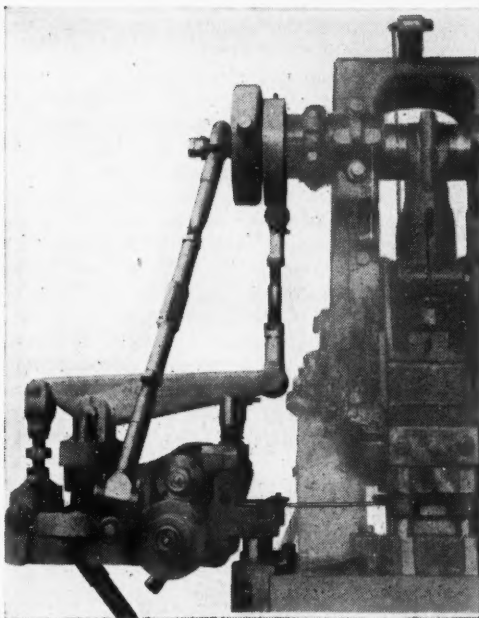
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tools should be adjusted to produce accurate parts.

There are many parts still produced by industry that can only be successfully inspected by fixed gages, he pointed out. Particularly is this true of screw threads where so many variables occur that thread ring and plug gages of the fixed type are still the best answer, he said. Gourlie added that for limited quantity production where tolerances are fairly liberal, fixed gages are meeting inspection needs adequately.

— o —

Unitized Skin and Frame Design May Put Airplane Manufacture On Mass Production Basis

MACHINED skin construction, in which the frame rib members of aircraft fuselages are machined directly from rolled sheet aluminum, may reduce aircraft production costs by eliminating thousands of man hours of hand labor. This statement was made by Jesse Daugherty, Consulting Engineer for Giddings and Lewis Machine Tool Company, Fond du Lac, Wisconsin, who have recently developed a new 34 ft. long contour milling machine to produce aircraft skins.

Daugherty pointed out that an advantage of machined aircraft skins is that they reduce the sealing required in conventional riveted frame and sheet construction. Many surface panels in aircraft are now parts of fuel tanks and require that all skin openings be sealed, he explained. Many alternate methods for machined skin construction are now under development, Daugherty said. At present, he claimed, milling of panels is most satisfactory considering accuracy, flexibility and finish.

The skin milling machines cut aluminum skin panels as fast as wood, Daugherty pointed out, but tool setting and measuring operations consume many times the cutting time. Both the airframe manufacturers and



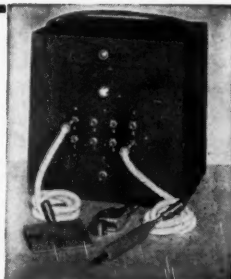
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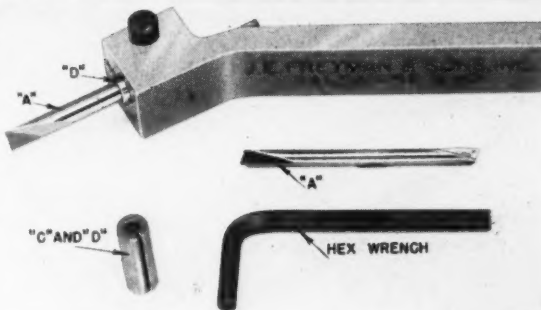
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$\frac{3}{16}$ " I.D. x $\frac{3}{8}$ " O.D. x $1\frac{1}{4}$ " Lg. Split Bushing C.R.S.—C.....	each \$.40
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the Air Material Command have so far resisted use of milled panels, however, he added, because up to 90 per cent of the original plate is converted into chips.

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Gun Barrels Now Produced By Process Used By Egyptian Brain Surgeons

"TREPANNING"—a cutting process used by the early Egyptian surgeons for brain surgery—has been adapted by industry's tool engineers for faster production of accurate gun barrels and similar defense products requiring the removal of considerable material to form deep holes.

The operation, according to Fred W. Lucht, Development Engineer, Carboloy Department of General Electric Company, Detroit, is about 10 times as fast as drilling the hole with a conventional spade drill, even when the

diameter of the hole is only 2 inches. For larger diameters, the advantage increases even further.

The process differs from drilling in that a cylinder of metal is removed by the tool. The central portion of metal in the hole is removed as a solid core after the operation is completed. Thus it is not necessary to convert all the metal in the hole into "chips."

Lucht said the process, which employs ultra-hard carbide tools, has been applied successfully to producing deep holes in high alloy as well as conventional steels. Lucht also forecast that the process could be applied successfully to the production of parts for civilian goods since the economies of the process are, he indicated, just as applicable to shallow as well as deep hole production. If used for such parts, he said, production costs would be reduced and accuracy increased.

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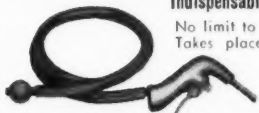
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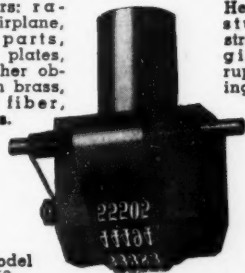
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Five Broaching Machines Replace 64 Machine Tools Producing Internal Gears

USE of the broaching process to produce teeth on internal gears instead of conventional gear generating methods is already cutting industry machine tool requirements and conserving factory floor space badly needed for defense expansion programs, it was revealed by J. A. Psenka, Engi-

neer for National Broach and Machine Company, Detroit. He also revealed that tremendous savings in capital outlay as well as savings in direct labor, maintenance and tool sharpening have resulted from using the broaching process to produce internal gears.

Psenka told about a plant which has been able to produce internal gears for 5,000 transmission units a day with only five broaching machines. He said that conventional generating and finishing methods would have required a total of sixty-four machine tools. According to Psenka, the savings in tool cost alone on this job amounted to \$250,000 on a total yearly production of 2,500,000 gears. He said that the gears produced by the broaching process passed rigid inspection requirements and gave excellent service in the field.

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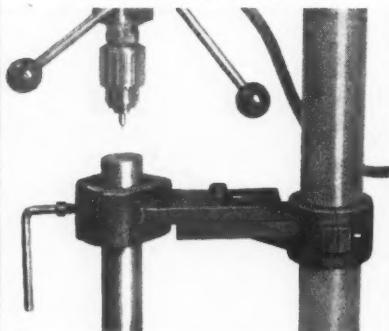
"Unmachinable" Metals Now Machined Without Cutting Tools

METALS so hard they cannot be machined by conventional methods—including tungsten carbide—are being shaped by a new electro-mechanical process, according to M. F. Judkins, Chief Engineer for Firth Sterling Steel and Carbide Corp., McKeesport, Pennsylvania. In the process, Judkins said, metal particles are actually "torn" from the workpiece by powerful electrical forces. Electrodes which never touch the work are used instead of cutting tools.

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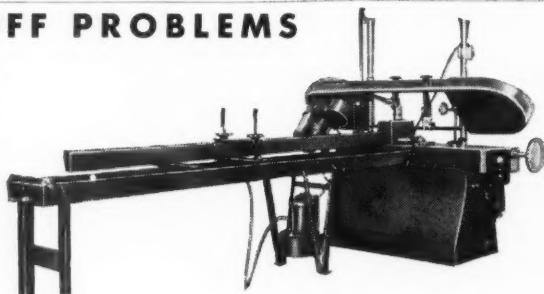
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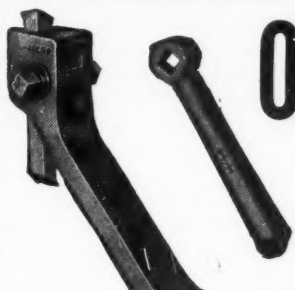
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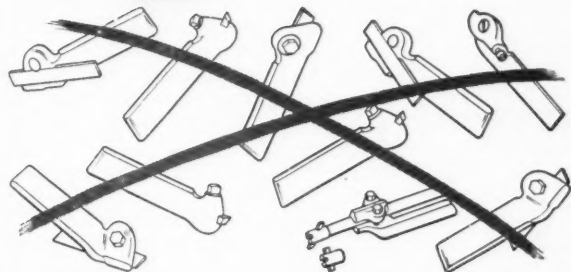
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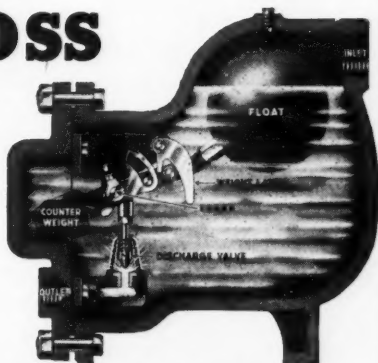
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The "cutting" action takes place in a liquid, he went on to say. Accuracy of within one thousandth of an inch was claimed for the process by Judkins, who added that accuracy of location of holes produced by the process was equal to that of many conventional machine tools. Threaded holes can be produced by the process, Judkins revealed. He said that a $\frac{1}{4}$ in. diameter threaded hole can be produced in carbide for around \$20.00, while a

rough drilled and reamed $\frac{1}{2}$ in. diameter hole $2\frac{1}{2}$ in. deep can be produced in the same material in three hours for \$30.00. Judkins said that "cutting" rates of several inches per minute are within the realm of possibility for the process.

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Production Rates On Military Equipment Reduced By Advent of New Hard Materials

DESPITE improvements in machines and tools, production rates at which military parts can be produced have been sharply cut by the advent of new and harder materials, according to figures given by Carl J. Oxford, Chief Engineer, National Twist Drill and Tool Company, Rochester, Michigan. Oxford pointed out that most parts require the drilling of one to many holes. His figures showed that the new harder materials permit drilling the millions of holes required at only one-third to one-half as fast as do parts made of aluminum, steel or iron.

He said it was necessary to adhere to these lower rates in order to keep down tool breakage and tool costs and time required to change tools on the machines. Oxford said that best procedure was to use the highest rate of penetration possible, combined with a reasonable drilling speed for the material in question. Depth of penetration per revolution of the drill should

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be adjusted first, he added, if it was found necessary to improve performance.

— O —

"Aging" of Metal Parts Cuts Accuracy of Precision Machines

EVEN if a precision machine doesn't "wear out" it can be rendered useless for making modern tools because the metal parts of which it is made change their shape with age. F. C. Victory, Chief Engineer of the Moore Special Tool Company, Inc., Bridgeport, Connecticut, said that metal parts can grow, shrink or distort with age, thus decreasing the accuracy built into the machine. He said that the cause of these aging factors is relaxation of internal locked-in stresses and gradual change in the crystalline structure.

As a case in point, Victory described a high quality gage block that grew 50 millionths of an inch in a few months at the National Bureau of

Standards. He also told of a lead screw 16 in. long which grew $1\frac{1}{2}$ thousandths of an inch in a year and shortly afterward shrunk by half that amount. Victory said that the only cure is the application of heat treatment techniques that will relieve stresses in the parts before they are machined. Consistent accuracy required of today's precision machines has led to the heating of some components to a constant temperature to avoid change in dimensions resulting from changes in room or operating temperature.

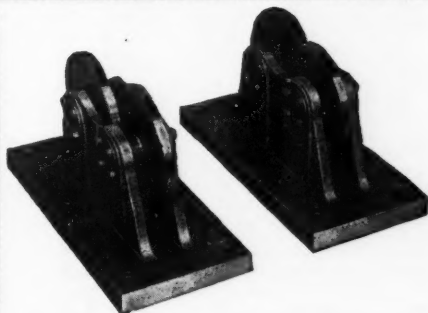
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Machine Tool Need Reduced By Multiple Purpose Work Holding Fixtures

WORK holding fixtures which can be used to cut the number of machine tools needed, increase accuracy and also reduce tooling costs in military programs were described. The fixtures are so made that a number of operations can be performed on pro-

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duction parts without removing the parts from the fixture, according to Joseph I. Karash, Process Engineer for Reliance Electric and Engineering Company of Cleveland, Ohio.

Karash described five different types of typical drill press fixture designs which permit drilling, reaming, tapping and other operations to be performed on each production part while held in the single holding fixture. Parts handling is thus greatly reduced. Fixtures of this type are particularly

adaptable to military production programs with low production rates, he said. They reduce costs because they permit one machine tool to perform many operations. Also they supplant several fixtures of special design that would be required if one machine were provided for each operation.

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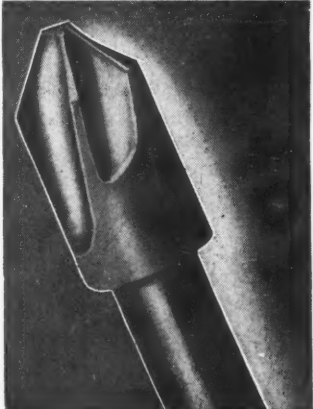
Electroforming Process Conserves Materials, Meets Military Needs

ELECTROFORMING, a process used to make fountain pen caps and musical instruments, bells and jewelry, is now being applied to produce parts for military equipment, according to Dr. C. L. Faust and W. H. Safranek of the Electrochemical Engrg. Division at Battelle Memorial Institute, Columbus, Ohio. They said that the value of products produced in America by the electroforming process now exceeds \$500,000,000.

The electroforming process is a method by which a thick layer of metal is deposited electrically on a form that is later removed from the shape, they explained. Typical military parts now produced by this method include 6-ft. diameter searchlight reflectors, 15-ft. radome molds, electro-clad bearings, radar feed horns and computing machine components.

New developments in the process now permit aluminum parts to be shaped by electroforming, the speakers said. An important current advantage

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of the process is that it conserves critical materials because parts can be produced to finished size, requiring little removal of excess material to complete them. Production costs are equal to or less than those of other methods it is claimed. In addition, the speakers pointed out, the electroforming process is often the only one suitable for producing certain vital parts.

— o —

Machine Tool Productivity Can Be Multiplied Ten To Twenty-Fold

AUTOMATIC screw machine tools can be made to produce from ten to twenty times the pieces per hour they are now turning out if carbide tooling is utilized to its fullest extent. This startling claim was made by C. R. Morgan, Consulting Engineer for Cone Automatic Machine Company of Windsor, Vermont.

According to Morgan, this tremendous increase in machine productivity, with resultant decrease in need for scarce machine tools, can be accomplished by applying carbide tooling in a planned program that involves the tool engineer, shop foreman, tool grinder and the machine operator. Necessary for this program are only minor improvements in machine tools, plus improved tool designs, tool holders and machine accessories, Morgan said.

In an actual example cited by Morgan, production time was cut from 90

to 15 seconds per piece on an automatic screw machine by simply applying carbide tooling concepts. Morgan pointed out that automatic loading devices will become necessary when the productivity levels he envisions are reached. He said that with these high production rates, must come new developments in inspection equipment and methods to assure that the parts made—at such speeds—will also be accurate.

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Ultra Hard Carbide Metals Finding New Defense Uses

HIGHER-SPEED machining of metals—at speeds of 1,000 and 2,000 feet per minute—will require the development of new specialized machine tools. J. S. Gillespie and I. L. Wallace, Carbonyl Department of General Electric Company, Detroit, said that in the case of steel parts, forgings would probably have to be especially heat-treated. New grades of carbide cutting tools will also have to be developed.

Among new uses for ultra-hard carbides, Gillespie and Wallace mentioned titanium carbides now being developed for jet engine blades; chrome carbides used for high temperature and wear-resisting applications, tantalum car-

bides and others. New applications of carbide tools in defense work were also illustrated and discussed by the speakers.

— O —

Atomic Energy Studies May Revolutionize Metal Cutting Practice

THE possibility that further studies of methods of changing the energy of atoms in metals may revolutionize present methods of machining was forecast. According to K. R. Blake, Vice-President and Consulting Metallurgist, Metalloid Corporation, Huntington, Indiana, the use of cutting fluids capable of yielding atomic elements could permit major increases in cutting speeds, increases in tool life of from 400 to 800 per cent; and greatly increased machinability of "hard to



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31 to 40	5 1/4	.70		11/64	12	9	1.65	23/64	12	9	2.75
41 to 50	4 1/2	.60		3/16	12	9	1.65	3/8	12	9	2.75
51 to 60	3 1/2	.50		13/64	12	9	1.80	25/64	12	9	3.05
				7/32	12	9	1.80	13/32	12	9	3.05
				15/64	12	9	1.95	27/64	12	9	3.30
				1/4	12	9	1.95	7/16	12	9	3.30
				17/64	12	9	2.05	29/64	12	9	3.60
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machine" metals. Principal requirement would be that the atomic element liberated from the cutting fluid should be usable to increase the atomic energy of metals at the point of rupture.

Any increase in such atomic energy within the metal would greatly improve its machinability, Blake told the tool engineers. According to Blake, the theory which he calls "Dynatomics" also explains many of the formerly little understood phenomena in metal cutting.

— o —

Low Cost Blanking Dies Can Speed Tooling

"TOOLING for Security" can be speeded by the temporary use of metal stamping dies that cost half as much as permanent type dies. This statement was made by R. C. Berliner, President, C. D. Cash Manufacturing Company, Chicago. Berliner said that his own company had made up such temporary dies from parts of standard die sets. Further cost reduction has been achieved, he added, by also standardizing on die mountings.

The total number of pieces that can be produced by these dies is limited only by the speed of the operation, he said. Berliner also described progressive type and compound type permanent blanking dies used for long run production. Compound dies, which are used to produce flat sheet metal blanks can cost less than progressive dies for the same job. This is due, he said, to the fact that compound type dies are smaller and more compact.

— o —

Shortage of Quality Steel Sheet Limiting Designs

NEXT year's automobile may not be as streamlined as it could have been if the automotive industry could obtain sufficient high quality deep drawing steel sheet. This was brought out by Charles R. Cory, Engineer in Charge of Die Engineering for the General Motors Fisher Body Division,

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Detroit. The question of whether a drawn steel shape like a body panel can be produced as the stylist wants it, he said, depends on the characteristics of the steel sheet from which it is formed. It must neither wrinkle nor tear in being formed.

In these days of uncertain steel quality and scarcity of deep drawing steel, die designers have to limit the shape of drawn parts to avoid wrinkles and tears in the material, Cory said. He said that in manufacturing a body panel, the size of the sheet steel blank that is to be formed to shape in a drawing die is determined by the number of perfect panels that can be produced with commercially available steel. There is always scrap to be trimmed from the drawn shape, he added, but any wrinkles or tears in a panel scrap the entire panel. If steel sheet quality is not consistent, unpredictable scrap production can occur in excessive amounts.

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Boron Steels Prove Good Substitute Materials

BORON steels which are being substituted for alloy steels because of critical material shortages can be hardened as satisfactorily as the alloy grades and offer no problems in machining, according to J. D. Graham, metallurgist for the International Harvester Company, Louisville Works.

During the current "Tooling for Security" week, Graham explained that the acceptance of boron steels was based on the now accepted theory that all steels, if heat treated properly to a given degree of hardness, exhibit the same mechanical properties.

The unknown factors, he said, have been the ability to harden boron steels properly and also the machinability of the various grades. All evidence thus far seems to have given the green light to boron steels, he added. Graham said that carburizing grades of boron steels can be successfully substituted if careful consideration is given to their peculiarities. In his own company, 77 per cent of their medium-carbon grades of steel have been changed over to boron steels.

— 0 —

New Casting Process Cuts Costs, Saves Materials and Utilizes Unskilled Labor

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reducing material losses usually incurred in conventional sand casting methods. This was revealed by Richard Herold, Manager, Foundry Products Department, Chemical Division, The Borden Company, New York City. Factors that help the process cut costs are that unskilled and women workers can operate the equipment, and that far less machining is required on the cast part, Herold said.

He said that sand castings produced with "Croning process shell molds," as they are called, can be mass produced to tolerances of from two to three thousandths of an inch per inch of length compared to twice this amount for the best conventional sand casting. Some castings have been produced to tolerances of only one thousandth of an inch per inch of length, he added. Castings with such close tolerances require few subsequent machining operations and thus greatly cut production costs and time, he said.

Herold revealed that the process is not confined to small parts. Castings weighing more than 200 pounds are being produced with the process, he said. At one time it was thought that a 20 pound casting was the top limit for parts sand cast by shell molding, he added. Aluminum, iron, bronze, alloy steels and stainless steels are all suited to shell molding, according to Herold, and development is progressing in applying the process to magnesium and low carbon steel.

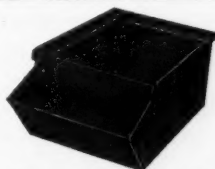
— O —

Small Vacuum Tube Solves, Interchangeability Problem On Accurate Defense Parts

ENGINEERS of the General Motors Research Laboratories, Detroit, revealed details of an instrument developed to meet a critical inspection problem on ordnance aircraft equipment. In a joint paper, A. F. Underwood, Head; J. B. Bidwell, Assistant Head; and J. H. Brems, Research En-



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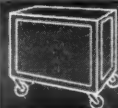
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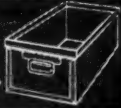


Sterling "Top Rim" Steel Stacking Box with drop handles.
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gineer of the Mechanical Engineering Department of the G. M. Laboratories disclosed that surface roughness as small as a millionth of an inch can now be checked with a compact and light weight portable instrument called the "Surfage."

Chief element of the device is a vacuum tube only $\frac{1}{8}$ of an inch in diameter and one inch long. The elements within this vacuum tube can be moved rela-

tively to each other. When so moved, the voltage rapidly changes. The movement is produced by a well protected diamond stylus which is drawn by hand across the surface to be checked and which is connected to the tube through a liquid of high viscosity. The "Surfage," according to the authors, is expected to solve the problem of maintaining interchangeable roughness standards on parts for defense items produced in different plants. Many of these require close control of roughness. The instrument can be used on flat, curved and double-curved surfaces.

— 0 —

Atomic Structure of Die Steels Controls Performance

IF a metal forming die wears out, it's too soft; if it breaks, it's too hard, and in either case costs can be cut if the trouble is remedied, according to Dr. S. G. Fletcher, Chief Metallurgist for Latrobe Electric Steel Company of Latrobe, Pennsylvania. Fletcher said that die steel hardness can be adjusted to best advantage by heat treatment. He explained that the ability to harden iron-base alloys of which dies are made depends on the two different atomic arrangements that are present in iron: one at room temperature and the other when it is above its critical temperature. Thus, by heating iron above its critical temperature and cooling it quickly to room temperature the hard atomic structure formed at the high



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temperature is retained in the material.

To attain the desired degree of hardness in metal forming dies, extremely close control of temperature during the heat treatment process is necessary, Fletcher said. He also pointed out that die wear is affected by the amount of carbon in the surface and recommended that this factor be controlled by methods that prevent loss of carbon from the die surface during heat treatment.

— O —

Ground Parts Now Mass-Produced To Accuracies of a Few Millionths of An Inch

MASS production of ground cylindrical parts to accuracies of only a few millionths of an inch—about one one-hundredth the thickness of a human hair or about the wave-length of light—was revealed by A. E. Mandeville and J. Meehan of Brown and

Sharpe Manufacturing Company, Providence, R. I. In their discussion of the newly developed process they told how this has been accomplished by simply refining a standard production grinding machine.

The parts as produced by the improved machine were accurate to within 25 millionths on diameter, 10 millionths for roundness and 12 millionths of an inch for taper. The latter was obtained by installing measuring equipment on the machine able to give readings to within one tenth of a millionth of an inch per inch of work length, they said.

Actually three grinding operations were required to produce the parts to the required accuracy. Before the finish grinding operation, it was necessary to run the machine for a half hour to stabilize the temperature of the machine and its parts. Then the parts were ground in a controlled-temperature room. So fine are these

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accuracies that fine nylon wiping cloths were needed to wipe the parts free of moisture and lint before inspecting them for accuracy, the speakers said. They stated that with proper maintenance, machines of the type used will retain such accuracy indefinitely.

— 0 —

Deoxidizer Added To Furnace Charge Ups Machinability of Iron Castings

ADDITION of a briquetted deoxidizer to the charge of a foundry furnace will produce iron castings that can be machined 25 per cent faster than conventional castings, with up to 40 per cent greater tool life.

According to Frank S. Kleeman, Consulting Engineer, increasing machinability of metals is one way that industry can ease the machine tool shortage.

Castings that have been deoxidized can actually cost less too, Kleeman pointed out, because they often do not require an annealing operation before machining operations are performed.

An example given by Kleeman of what can be achieved in increased tool life by specifying deoxidized castings was an increase in tap life from 350 to 500 castings. The deoxidized castings were made from 100 per cent scrap. The deoxidizing agent that acts on the iron during melting is a specially prepared type of silicon carbide, Kleeman said. The reason it improves machinability of metals, he explained, is that it eliminates segregation of the microscopic constituents of cast iron and gives a structure of more or less random dispersion.

— 0 —

Automatic Inspection Devices Built Into Machine Tools Cut Scrap, Increase Production

DEVICES that control machine tool operation by automatically gagging the part during machining are helping industry produce close toler-

ance parts at lower cost with minimum scrap, thus offsetting rising costs and lack of skilled labor, according to W. E. Moody and R. A. Green, Engineers for Bay State Abrasive Products Company, Inc., Westboro, Massachusetts.

The devices, according to Moody and Green, automatically shut off the machine the instant parts are finished to size. The operator only has to load and unload the parts and performs no gaging operations of any kind, they pointed out.

With automatic size controls parts can be produced up to three times as fast as where part dimensions have to be gaged by the operator of the machine, they said. Tolerances on the ground parts are within two or three tenths of a thousandth of an inch, they added.

The devices, which are currently being used on both cylindrical plunge cut and internal grinding machines are of either air or electric-controlled types.

Green and Moody said that further savings can be achieved in production grinding operations in industry if automatic size controls are also applied to cylindrical traverse grinding operations.

— O —

New Machine Developments Cut Costs, Speed Production of Precision Ground Parts

HIGH costs of extremely smooth and accurate ground surfaces, demanded by the "Tooling for Security" program, are being reduced by new grinding machine developments. This statement was made by B. H. Work of the Carborundum Company, Niagara Falls, New York.

According to Work, major cost reduction is being achieved by designing grinding machines that finish more than one surface at a time. Builders of grinding machines are now supplying equipment on which a single grinding wheel finishes multiple diameters and

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radii, Work said. They are also building grinding machines with several grinding wheels on each machine so that they are able to finish several diameters and forms in a single setup, he added.

He also revealed that grinding machine builders are now working on new machine developments that may provide fully automatic work handling and loading devices combined with fully automatic grinding and gaging functions to increase output even more. Accuracy is not being sacrificed, he added, pointing out that parts can now be produced in quantities, by grinding, to tolerances of one one-hundred thousandth of an inch and less.

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Brains, Not Brawn Required of Today's Production Workers

IN spite of the complete mechanization of industry today, the best unskilled worker is one with intelligence,

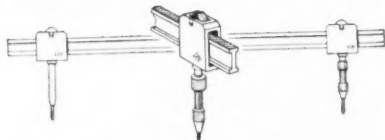
according to Dr. J. E. King, head of a firm that tests worker aptitudes. According to Dr. King, today's production worker needs "tool comprehension," "object perception" and coordination. A well developed physique, he said, has no relation to his ability to do even ordinary assembly jobs. In addition to these aptitudes, a really skilled worker requires office comprehension, systems, and space relations aptitudes, he added.

American industry has been broken down into five job families with 24 job areas by King's aptitude study methods. The five families are; mechanical, clerical, sales, technical and administrative. All require special aptitudes in varying degrees, according to Dr. King. King said that many factory workers today are overqualified for their jobs. These workers are an asset to industry, he said, only if their "over-qualifications" are known so they can be "earmarked" for advancement or

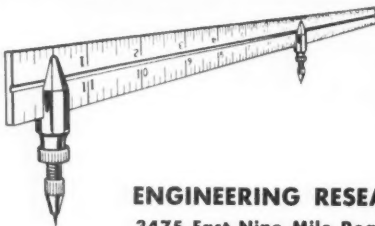
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special assignment. If an employee is overqualified, King added, he stays on an ordinary job only from two days to three months.

— o —

Higher Production Rates, More Automation Predicted

HIGHER production rates in precision grinding operations will be possible with new heavy-duty, automatically controlled grinding machines of the future, according to A. W. Todd, Assistant Chief Engineer of the Van Norman Company, Springfield, Massachusetts. Todd said that the precision grinder of the future would not only have an automatically controlled work cycle but would also be provided with devices that will load and unload the machine faster than any human operator.

He said that many components for military equipment now being ground require special purpose machines, which are being provided with the au-

tomatic controls he envisions. A typical machine of this type is now used to grind the leading and trailing edge of a jet engine rotor blade in only 15 seconds, Todd said. He pointed out that industry can also raise production rates on present grinding equipment by controlling heat treat processes and machining operations that precede grinding operations, thus enabling reduction in the amount of material which has to be removed by grinding.

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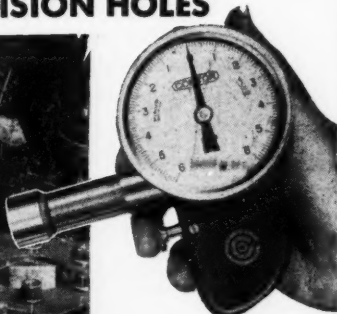
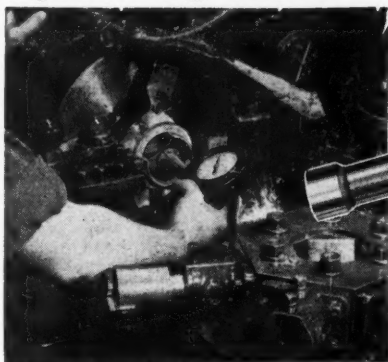
Power-Operated Devices Recommended To Cut Worker Effort, Raise Productivity of Machine Tools

POWER-OPERATED work holding devices are now being installed on machine tools to eliminate worker effort, reduce scrap and raise productivity per hour, through more efficient machine utilization, and cut number of machines needed.

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by H. L. Stewart, Assistant Sales Manager, Logansport Machine Company, Logansport, Indiana.

Stewart pointed out that maximum production with minimum scrap is the goal of all companies under the dual production tooling program. The devices that have been added to machine tools to aid in this effort are called power chucks. They are actuated by either air or hydraulic power and are push-button controlled, he said.

In actual tests it has been found that these devices reduce time required to clamp the work in the machine as much as 75 per cent. They also have the added advantage of clamping the work more accurately than an operator can with manual effort, thus reducing scrap losses resulting from tight or loose clamping, he added. According to Stewart the devices are good for many years of service with minimum maintenance.

Tooling Costs Can Be Cut By Better Engineering

MANY tools and dies, in which expensive labor and material are invested, are being scrapped in heat treatment processes before they can produce a part. This was revealed by E. J. Pavesic, Research Director of Lindberg Steel Treating Company, Chicago.

Pavesic said that many of these tool and die losses can be avoided by selecting correct materials, making better designs and specifying correct heat treating practices. He also pointed out that regardless of the type of material specified for tools and dies, chemical analysis should conform to established standards and physical defects should not be present.

Much of the responsibility for cutting tool and die losses in heat treatment processes falls on the shoulders of tool engineers in industry, he said, because

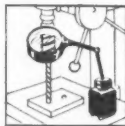
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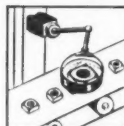
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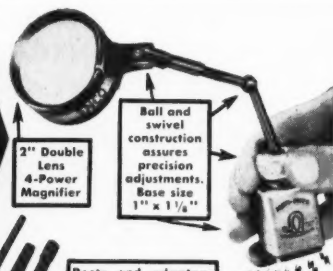


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they are responsible for the design of tools and dies. According to Pavesic, the heat treatment technique for tools and dies vary directly with the design and therefore selection of material, design, and heat treatment must be considered simultaneously by the tool engineer.

— o —

Electronic Controls Broaden Machine Tool Versatility, Permit Top Production Rates

THE needs of industry for versatile machine tools that can get top performance from modern fast cutting tool materials are now being met by drives controlled by electronic devices, according to E. H. Vedder, Manager of the Industrial Electronics Section, Westinghouse Electric Corporation, Buffalo, New York.

Vedder told industry production experts that electronic controls permit a machine tool to be operated over a wider range of speeds. They also permit automatic variations in speed of the machine while actually cutting. This permits cutting tools to operate at constant cutting speeds regardless of variations in diameter of the work, he added.

Simple types of fully electronic controls for machine tools cost less, in drives under five horsepower, than other types that permit similar adjustable speed characteristics, Vedder said. One reason that electronic drives have come to the forefront in machine tool designs today, he claimed, is that they work best at high speeds, and most machine tool builders are developing high speed equipment to meet high productivity levels demanded by industry.

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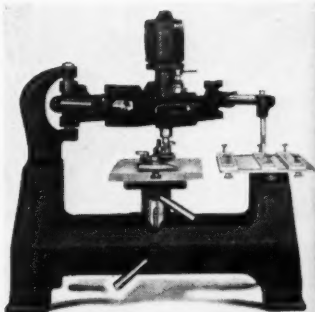
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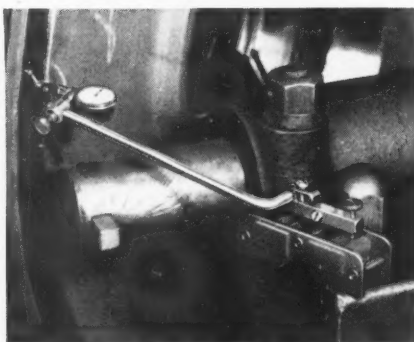
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ation ratio, offer industry a low cost type of versatile equipment that can be easily adapted to automatic and remote control. Such devices were described by H. G. Keller, Assistant Chief Engineer of the Link-Belt Company's Philadelphia plant.

According to Keller, these mechanical variable speed drives can be manually controlled by a handwheel or remotely controlled by an electric motor operated by a pushbutton.

They can be adapted to semi-automatic or fully automatic operation by including any of a variety of control systems, Keller said. These systems include a unit that transmits an impulse to a receiver that resolves the impulse and causes an actuator to change the ratio of the drive, he explained. Hydraulic, electrical and air devices can be used in the transmitter and receiver, he added. Mechanical variable speed drives permit infinite adjustment of speed ratio and maintain the ratio within less than one tenth of one per cent, Keller claimed. He said that an increasing need for drives of this type is developing.





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New A.S.T.E. officers: (left to right, front) G. A. Rogers, Asst. Secy.-Treas.; R. F. Waindle, 1st Vice President; L. B. Bellamy, President; J. P. Crosby, 2nd Vice President; H. E. Collins, Secretary; Dr. H. B. Osborn, Jr., 3rd Vice President. (Rear) H. E. Conrad, Executive Secretary. H. C. McMillen, re-elected Treasurer, not shown.

A. S. T. E. Elects Officers

LESLIE B. BELLAMY, Detroit Manager, Sterling Grinding Wheel Division, Cleveland Quarries Company, was elected president of the American Society of Tool Engineers for 1952-1953 at the society's 20th annual meeting held recently in Chicago. He succeeds J. J. Demuth of the National Production Authority in Washington, D. C.

Elected first vice president of the society was Roger F. Waindle, Director of Research, The Nugent-Sand Co., Inc., Muskegon, Mich. Joseph P. Crosby, Vice President, The LaPointe Machine Tool Co., Hudson, Mass., was named 2nd vice president, and Dr. Harry B. Osborn, Jr., Technical Director, TOCCO Division, The Ohio Crankshaft Co., Cleveland, Ohio, was named 3rd vice president.

Howard C. McMillen, Plant Manager, Philco Corp., Bedford, Ind., was re-elected treasurer of the A.S.T.E.; H. E. Collins, Chief Production Engi-

neer, Hughes Tool Co., Houston, Texas, was elected secretary; and Gerald A. Rogers, Rudel Machinery Co., Ltd., Montreal, Canada, was elected assistant secretary-treasurer. Harry E. Conrad of Detroit is executive secretary of the society.

Elected as new directors were: Willis G. Ehrhardt, Managing Partner, Ehrhardt Tool & Machine Co., St. Louis, Mo.; Gerald A. Rogers; Fred J. Schmitt, Director of Sales, D. A. Stuart Oil Co., Ltd., Chicago, Ill.; and Roger F. Waindle. Directors re-elected were: L. B. Bellamy; T. J. Donovan, Jr., Owner, Donovan Co., Philadelphia, Pa.; H. B. Osborn; George A. Goodwin, Chief Process Engineer, The Master Electric Co., Dayton, Ohio; B. J. Hazewinkel, President, Daily Grinding, Inc., South Gate, Calif.; and W. B. McClellan, Engineer, Gairing Tool Co., Detroit, Mich. J. J. Demuth, past president, also serves as a director of the A.S.T.E.

NEW SHOP LITERATURE

Universal Type Production Machine. Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Calif., has prepared a four-page three-color bulletin on its No. 2 Model A Burgmaster, a six-spindle power-indexing universal type production machine with individual preselective spindle speeds designed for high production with maximum efficiency and accuracy.

"Pioneer American Machine Tool Builders" is the title of a 16-page brochure published by Bennett Machinery Co., Clifton, N. J., which contains portrait photographs of 96 men who, in the year 1903, were considered leading American machine tool builders.

Production Presses. A four-page two-color bulletin (No. 711) issued by Di Machine Corp., 2714 W. Irving Park Rd., Chicago 18, Ill., illustrates and describes in detail the Diebel 40-Ton Di-Matic, a fully automatic press for the high production of various types of steel stampings.

Cemented Carbides. Greenleaf Corp., 512 Franklin Ave., Pittsburgh 21, Pa., distributor of Newcomer carbide tools, has issued a 20-page catalog listing the Newcomer line of standard and special cemented tungsten carbides for machining steel, cast iron, non-ferrous metals, and non-metallics. The catalog is written in semi-technical terms to provide complete information on standard blank, standard tools, and adjustable clamp tools; carbide milling data; cutting and grinding data; prices; and other useful information.

Air Turbine Motors with attachments for use as portable routers on wood, plastics, and non-ferrous metals are fully described and illustrated in an eight-page two-color bulletin (No. 1138) issued by Onsrud Machine Works, Inc., 3924 Palmer St., Chicago 47, Ill. The bulletin discusses in detail the construction features of motors, which are available in capacities from $\frac{1}{4}$ up to 2 h. p. with speeds of 22,000, 30,000 or 50,000 r. p. m. Also included are complete specifications, information on available extra equipment, and typical application views of the portable routers, which are supplied in kits.

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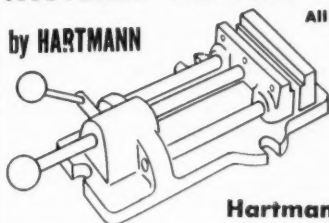
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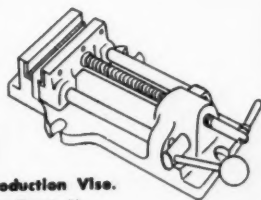
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Milling Tools. A 12-page catalog (No. 51-806) of milling cutters, slitting saws, end mills, shell mills, keyseat cutters, and T-slot cutters has been published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Contained in the catalog are price data and descriptive information to aid in the selection of the proper tool. In addition, there are helpful tips on regrinding, increased tool life by the use of soluble oils, and information concerning special cutters, as well as tabulated data recommended by milling machine manufacturers on speeds and feeds.

Balancing Machines. R. B. Annis Co., Indianapolis 2, Ind., now has available a two-color catalog illustrating and describing in detail a line of dynamic balancing machines for locating and measuring the amount of unbalance in rotating parts at speeds from 500 to 50,000 r.p.m. Complete specifications of the various machines are included, as well as illustrations of typical applications of the machines.

Twist Drill and Tap Grinders. Catalog sheets on the line of twist drill and tap grinders manufactured by Meteor, Ltd., Zurich, Switzerland, are now available from Carl Hirschmann Co., 30 Park Ave., Manhasset, New York.

"Heat Treatment of Aircraft Steel" is the title of a four-page illustrated technical bulletin now being offered by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa., which explains how the maximum hardness and strength of aircraft and other steels can be developed to meet U. S. Government Specification MIL-H-6875 through the use of extra high speed quenching oils, such as Houghton-Quench "K".

Jig and Fixture Components. Northwestern Tool & Engineering Co., 119 Hollister Ave., Dayton 3, Ohio, has announced a four-page illustrated catalog (No. 20) describing 167 sizes of jig and fixture components for the reducing set-up time on jig borers, milling machines, slotters, planers, boring mills, punch presses, and so on. Products covered include flanged nuts; T-nuts; step blocks; coupling nuts; punch press sets; T-nut and stud sets; step block sets; cut thread studs; cast iron hand knobs; quarter turn screws; shoulder screws; screw type jig feet; knurled head screws; press-fit type jig feet; double-end jig feet; latch bolts; fixture keys; and spherical washers.

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Turning Machines. A four-page two-color folder prepared by Turnomat Co., Inc., Brockport, N. Y., illustrates and describes in detail the Karge Turnomat Turning Machine, which, when mounted on a lathe cross slide or on the face of a screw machine turret or cross slide, becomes an independent self-contained high precision bar turning accessory capable of turning work to high degrees of accuracy and to unlimited diameters and lengths. Complete specifications of Karge Turnomat Machines and accessories are included.

"Static and Dynamic Balancing," is the title of a 16-page booklet released by Gisholt Machine Co., Madison 10, Wis. Of particular interest to design and methods engineers, the booklet is a reprint of Section 89 from the First Edition of the Tool Engineer's Handbook and is supplied together with separate information on the Gisholt Balancing School.

Grinding Bulletins. A revised series of Carborundum Grinding Bulletins designed to provide information for improving grinding efficiency has been announced by The Carborundum Co., Dept. MMS, Niagara Falls, N. Y. Eight of the bulletins are entirely new, making a total of 32 bulletins in the series. The entire series is available by requesting Form A-1024.

"Gear Finishing—When and How to Use It" is the title of a four-page folder now available from Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Under the subject of economics of gear shaving, eleven advantages of the process are described. The various types of gears, gear materials, and gear sizes that can be shaved are given. Line drawings and descriptive material explain how gears are finished by shaving and how accuracy is achieved. Underpass, Modified Underpass and Transverse shaving methods are discussed in detail. Also described and illustrated are two methods for crown shaving.

End Mills and Diesinking Tools. The Metal Removal Co., 1546 N. Orleans St., Chicago, Ill., now has available a six-page two-color catalog (No. 23) which contains illustrated, descriptive, dimensional, and price information on the company's new line of end mills and diesinking cutters that are offered in a wide range of standard sizes in single and double-end types of small and large diameters and with two, three, or four flutes (straight or spiral) and straight or ball ends.



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Robbins & Myers, Inc., Springfield, Ohio, now uses Desmond precision mechanical dressers on a Cincinnati Centerless for grinding motor armatures. Mr. Worley, department foreman reports, "The new Desmond dresser does the job as fast as the single point diamond nibs we used previously. It costs half as much, and is a lot more rugged. We don't have to worry about accidental damage or loss of the diamond." Above is a close up of the new dresser installed on the centerless grinder in the Robbins & Myers plant.

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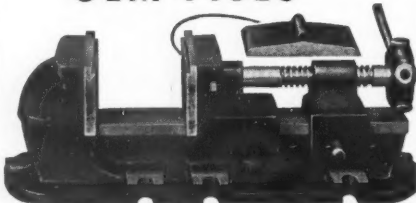
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"Fundamental Aspects of Metal Cutting and Cutting Fluid Action," is the title of a booklet announced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, which comprises a reprint of a paper published by one of America's outstanding metal authorities; namely, Hans Ernst, director of research at Cincinnati Milling.

Sliding Head Drill. Canedy-Otto Div., Cincinnati Lathe & Tool Co., Cincinnati 9, Ohio, has issued an eight-page catalog (D-108) which fully illustrates and describes the C-O Cincinnati 16-Inch 3,000 Sliding Head Drill that is available in floor and bench models with single and multiple spindles.

Illustrated Cutting Tool Chart. A 15 x 24-inch cutting tool chart tinned top and bottom suitable for office or shop posting is now available from Severance Tool Industries, Inc., 724 Iowa St., Saginaw, Mich. The chart illustrates and briefly describes tools representative of the Severance line, including Carbo-Mills, Midget Mills, Econo-Sinks, and special cutters.

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Thread and Form Grinders. An attractive, profusely illustrated catalog containing useful information on a line of precision thread and form grinders has been issued by The Sheffield Corp., Dayton 1, Ohio.

Abrasive Discs. A four-page catalog bulletin (Form No. ESA-54) issued by Simonds Abrasive Co., Philadelphia 37, Pa., describes the application of nut-inserted and bolt-inserted abrasive discs and cylinders for horizontal or vertical spindle disc and surface grinding operations. Included are grain and grade recommendations for common disc grinding operations.

Centers. A pocket-size catalog published by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., contains complete descriptions and illustrations of "Red-E" anti-friction centers, carbide-tipped centers, high speed centers, tool-holders, grinding and milling dogs, and accessories.

Machine Tool Attachments and Accessories. More than 160 different attachments and accessories for South Bend Lathes, Drill Presses, and Shapers are illustrated and described in a 36-page catalog (No. 5102) prepared by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind. Several new items are cataloged, including some recently developed attachments.

Small Tools. Brown & Sharpe Manufacturing Co., Providence, R. I., has prepared a 224-page catalog (No. 35) which contains illustrations, descriptions, and dimensions of a complete line of small tools, including machinists' tools, gages, milling cutters, hobs, arbors, adapters, collets, screw machine tools, pumps, and other useful equipment.

For Your Convenience...

the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 418, 420, 422 and 424.)

MODERN MACHINE SHOP
431 MAIN STREET • CINCINNATI 2, OHIO

"Modern Methods of Gardner Grinding" is the title of a 32-page two-color catalog (MM-9) published by Gardner Machine Co., 428 Gardner St., Beloit, Wis. Designed to provide complete information on modern methods of flat surface disc forming, the catalog, in addition to listing and describing various types of grinding machines, shows actual production jobs on which the machines were used, describes their specifications, and outlines the benefits obtained from each operation. The catalog is well illustrated with halftones of the machines and line drawings of parts ground in each case.

Ray-Man "F" Conveyor Belt, a general purpose heavy duty conveyor belt designed for application where there is danger of tearing or puncture, where small pulleys are used, where maximum flexibility and belt fastener life are required, and where thick, narrow belts are needed, is described in a Bulletin No. 6915 issued by Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, New Jersey.

Metal Cutting Tool Discount Sheet. A new discount sheet (effective October 1, 1951) for its Catalog 50 of metal cutting tools is now available from Reltool Corp., 4540 W. Burnham St., Milwaukee 46, Wis. The discount sheet covers all items described in the catalog, including arbors, bits, centers, counterbores, countersinks, end mills, mandrels, saws, reamers, taps, keyseat and gear cutters, and other tools.

Vapor Control. The control of vapor, mist, and fog from the most common wet machining operations is covered in Bulletin No. 622 issued by Agat-Detroit Co., 207 Main St., Ann Arbor, Mich. Four pages are devoted to illustrations of various self-contained unit type collectors which remove the vapor-laden air from the machine, extract the vapor from the air, and return the cleaned air to the working space. Illustrations of typical installations include thread grinders, centerless grinders, various types of screw machines, surface grinders, and so on. A table of the different collectors available compares their performance ratings, lists their dimensions and motor size, and, in addition to the current list price, also gives the number of machines each collector will serve under average conditions.

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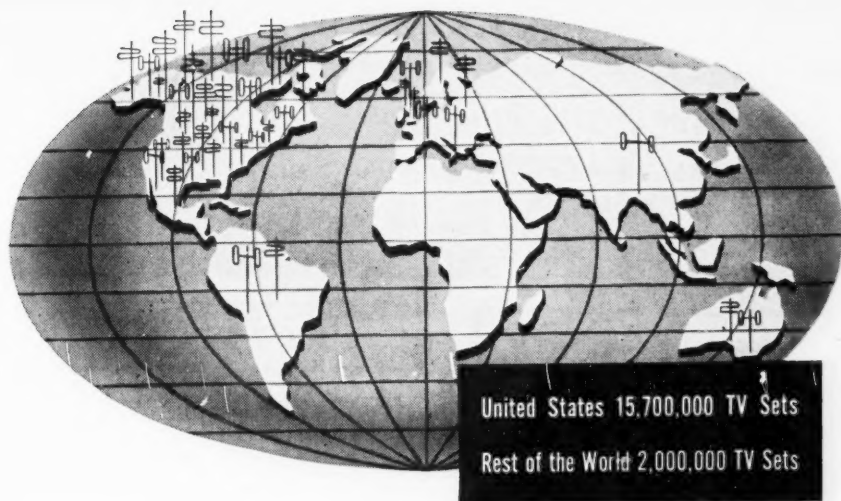


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There are nearly a thousand other companies that make home appliances, radios and television sets. And they do more than 4/5's of the business! The smallest of them

make the biggest companies hustle their bones to keep making products better and better.

In America, a better product can always win consumer acceptance in any field.

Let's keep the COMPETITIVE SYSTEM working for us

The Competitive System can be killed! When industries are run by government, when taxes are so high that they destroy the incentive to work hard and risk savings in business ventures, the Competitive System languishes and dies.

You've seen it happen in other lands. Let's not let it happen here.

Let's all of us watch closely to see that those who represent us in government are working with us and for us to preserve our Competitive System; to assure a tax structure that leaves enough incentive to make hard work worthwhile, so that *any* man with ability and energy has a chance to earn good money and keep most of it.

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"Principles of Abrasive Cutting" is the title of an informative 36-page booklet (DH-301) announced by Campbell Machine Division, American Chain & Cable Co., Inc., 931 Connecticut Ave., Bridgeport 2, Conn. The basic principles of abrasive cutting, its methods and applications, are fully described in this attractive red and black booklet. The Campbell line of machines is a correlative feature of the booklet in that information relative to materials cut and cutting capacities and illustrations of the machines themselves are well dispersed throughout the booklet.

Abrasive Belt and Wheel, Grinding, Polishing, and Buffing Machinery. Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., has released an informative 20-page catalog (No. 75) covering its complete line of abrasive belt and wheel, grinding, polishing, and buffing machinery. The catalog illustrates and describes bench and floor type wheel grinders and polishing lathes and backstands of various sizes and capacities for abrasive belt applications. Needed accessories for buffing and polishing operations are also featured in the catalog.

Rotary Work Feed Table. Bulletin T-85 issued by The Bellows Co., Dept. MMS, 222 W. Market St., Akron 9, Ohio, illustrates and describes completely the Bellows Rotary Work Feed Table. This 16-page bulletin includes installation photographs and describes in detail all parts of both the BRET 22 (standard 22-inch table top) and BRET 10 (standard 10-inch table top). Dimensional drawings and specification data are also provided in this three-color bulletin which shows wiring diagrams and electrical hook-ups for combining Bellows Rotary Work Feed Tables with other Bellows "Packaged" pneumatic devices.

Toggle Clamps. Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich., is now distributing a 16-page two-color catalog (52-A) which contains complete descriptive and illustrated information, including dimensional drawings, on its line of "De-Sta-Co" Toggle Clamps for clamping metal, wood, or plastic parts during welding, drilling, riveting, gluing, milling, machining, grinding, sawing, routing, or assembly operations. Information on toggle clamp accessories, shim stock, feeler stock, and arbor spacers and shims is also included.

WHERE TO GET IT

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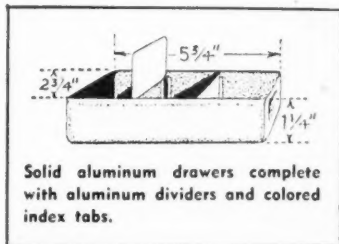
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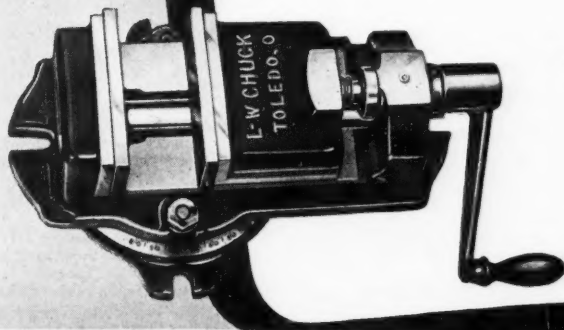
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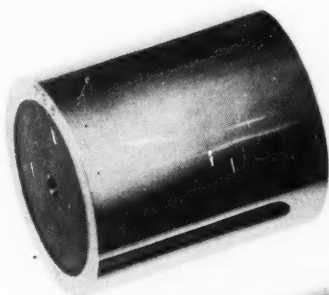
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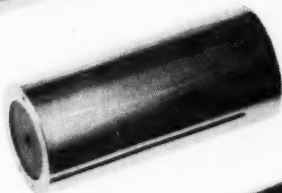


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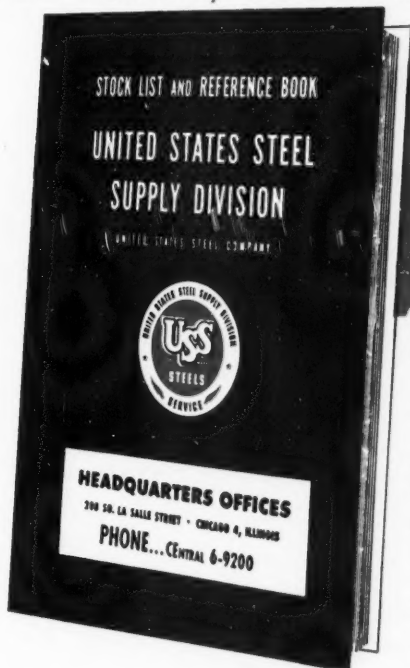
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Over The Editor's Desk

How Socialistic are You?

SOcialism, because it appeals to our natural charitable instincts, finds some degree of acceptance in most of us. And because unlike violent communism, socialism moves forward at an easy pace, it can overtake a nation without the people being conscious of what is happening.

Socialism is composed of very definite ingredients which, like separate pieces of a jigsaw puzzle, have no meaning until assembled into the grand pattern. Until we know what these ingredients are and whether we like them or not, we cannot tell how socialistic we are.

The material that follows is an effort to give you a simple yardstick with which to measure your own personal attitude toward socialism.

First of all, do you accept socialism's major premise that the world *can* be perfect—that there is a form of government that can eliminate the personal tragedies and injustices that have plagued the human race since the dawn of history?

If you accept this, you are then able to keep your eyes glued upon this shining goal and ignore the tragedies and injustices that must be perpetrated in order to reach that imagined goal. In other words, if you concentrate hard enough on the end, you can justify, in your own mind, the means that must be employed to reach that end.

The most classic example of this self-hypnotism was the socialist attitude toward the deliberate starvation of millions of Ukrainian peasants who refused to "co-operate": their death was a mere incident on the road to heaven-on-earth.

Second, do you approve of one of socialism's major policies—which we already have in America—the progressive personal income tax? Does it give you a certain satisfaction to know that the man who earns ten times as much as you do has to pay thirty times as much tax?

This tax policy was taken right out of the socialist platform and is based on the socialist principle: "From each according to his ability, to each according to his need." If you go along with this idea, you have taken one big step toward socialism.

Third, do you approve of high inheritance taxes (now in effect in the United States) which make it impossible for people to pass on any worthwhile degree of economic security to their children or family?

Just as the progressive tax prevents the formation of any important new group of wealthy people, the inheritance tax insures that most of the present wealth will pass into the hands of government upon the death of its present holders. It is very important to the promotion of socialism that the accumulation and holding of wealth be made impossible; so if you approve of the tax laws which accomplish that end, you are giving aid and comfort to socialism.

Fourth, do you approve of the present law which took gold from the people and gave unlimited spending power to the Federal Government?

This is the secret weapon of socialism because it gives Government control over the money supply and (through its inflation) control over the value of the people's earnings and savings. In the words of Karl

Marx, it enables government to "debauch the currency."

This control over the money has another value to socialism: it gives the Government a bottomless purse from which it can subsidize special groups and, in effect, buy the people's votes. If you can say, "That's all right with me," you have gone a long way toward becoming a socialist.

Fifth, do you believe that the relationship between "labor and capital" is essentially hostile?

Does the group of workers known as "management" (who plan the production and find the customers) inevitably seek to depress and abuse the group of workers known as "employees"? Do you consider it impossible that they could ever be partners instead of adversaries?

If your answer is "yes," then you must go along with the idea of using the power of government to protect "labor" from "capital."

Sixth, do you believe that profit is a drag on the economic progress of the people?

Do you believe that these payments for the use of people's savings (which have become tools of production) represent a

cost that could and should be eliminated from the economy? Do you think that the desire for profit inevitably results in monopoly, unfair practices, and exploitation of customers?

If your answer is "yes," the logical step is for you to support the policy of government ownership and management of the tools.

Seventh, do you believe that government can give anything to the people without first taking it away from the people?

This deception is socialism's neatest sleight-of-hand trick. The idea of "Federal aid" implies that the government can be a source of goods and revenue instead of just a redistribution agency. Yet millions of intelligent people have been hoodwinked by the "Federal horn of plenty."

The seven "test questions" cover most of the mental processes that lead people into supporting socialism. By grading yourself, you can find how far (if at all) you have been led down the road to Marxism. But if your score is bad, don't be surprised, because every one of these ideas when considered separately has definite appeal. —American Economic Foundation.



CHAUNCEY W. HINMAN

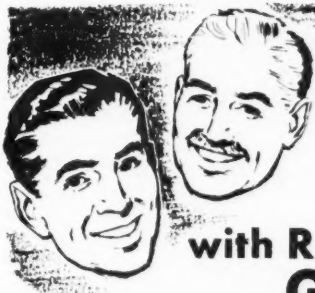
CHAUNCEY W. HINMAN, for several years contributing editor of *Modern Machine Shop*, passed away at his home last month at Gulfport, Mississippi. Prior to taking up residence in Gulfport, Mr. Hinman lived in Chicago where he was chief of jig and fixture designing for the Western Electric Company and later chief tool engineer of the Automatic Electric Company. He contributed to the designing of the tools for the first dial telephones.

Mr. Hinman was born in Iowa City, Iowa. He attended the State University of Iowa and the Illinois Institute of Technology in Chicago. He was the author of several books on tool designing, outstanding of which were *Pressworking of Metals*, *Practical Designs for Drilling and Milling Tools*, and *Die Engineering Layouts and Formulas*. He had written, over a period of years, more than a thousand articles for publication.

Under an agreement to supply the readers of *Modern Machine Shop* exclusively with his articles, Mr. Hinman arranged to provide his material well in advance of publication date. Before his passing, Mr. Hinman had prepared a series of five articles entitled "Unusual Presses and Dies." These articles are now on file and have been scheduled to appear in forthcoming issues. It is with deep regret that we must inform his many thousands of readers that these will be the last of Mr. Hinman's articles to be published.

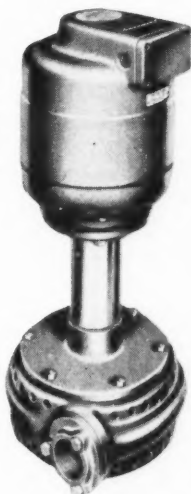
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NEWS
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of Swiss Preci-
sion Machine
Tools in the U.S.

HIRSCHMANN HIGHLIGHTS

ABOUT PRECISION



MACHINE TOOLS

PUBLISHED BY CARL HIRSCHMANN COMPANY, MANHASSET • LOS ANGELES • MILWAUKEE — APRIL, 1952

NEW WESTERN BRANCH

Largest selection of modern high precision Swiss machine tools displayed on the West Coast is at 5124 Pacific Boulevard, Los Angeles. Western Branch of Carl Hirschmann Co., whose executive offices are at 30 Park Avenue, Manhasset, N.Y.

NEW MIDWEST BRANCH

Showrooms and warehouse for complete machines, spare parts and factory service for all lines exclusively represented in U.S. by Carl Hirschmann Co., is being developed at 525 E. Michigan Street, Milwaukee. Russell T. Gilman is Executive Director.

PRECISION BALL BEARING MANUFACTURING

Precision Ball Bearing Manufacturers have taken a decided interest in Tornos Automatics for bearing races manufacture. Tornos Machines, slower than multiples, have proven to make up lost time by reducing and eliminating secondary operations.

AIRCRAFT INSTRUMENTATION

Leading U.S. instrument makers use Hauser Burnishing Machines for much of their super finishing work on small parts. The new Hauser Super Finishing Method with especially developed ceramic wheels has found many suitable and cost-cutting applications in the instrument field.

SWISS MACHINES TO U.S. STANDARD

Hirschmann disregarding additional manufacturing costs, is striving more and more to adapt Swiss machines to U.S. Standards. Most of their machines are not only built to such standards but also are equipped with U.S. fuse boxes, belts, switches and standard precision ball bearings.

AIR SHIPMENTS

In many emergency cases Hirschmann has made delivery of medium sized machine tools (2000 lbs) from Switzerland to Midwestern factories in 48 hours via transatlantic air freight service. Through special assistance by U.S. customs, air shipments are cleared with only a few hours delay in New York.

CAM AND TOOL SERVICE

Complete cam and tool service for Automatics is obtainable directly from Manhasset. Factory trained Hirschmann specialists assure accurate and prompt service.

DIAMOND WHEELS

Hirschmann has secured considerable quantities of diamond wheels, which are adaptable for most standard machines. Prices are somewhat above domestic wheels due to the fact that in Switzerland the diamond market is still operating on free market.

SPARE PARTS

Carried in stock at 30 Park Avenue, Manhasset, N.Y., is most every spare part necessary for Hirschmann machines. Large quantities of collets and carbide tools of every bore and size also are standard stock items.

If you want the complete issue of HIRSCHMANN HIGHLIGHTS regularly, write Carl Hirschmann Co., 30 Park Ave., Manhasset, N. Y.

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CUSTOM BUILT TO MEET
YOUR NEEDS



Item B-426
\$67 20

STOCK CHECKER'S TRUCK

Designed to handle a large variety of items or parts. Three steel shelves with 1" flanges all around. Floor clearance 9 1/2". Overall height to top shelf 42 1/2", top of table 50". 44" long, 20" wide. All steel welded construction. Semi-crated approx. 190 lbs.

Item NS-364 Item B-704



SHEET STEEL GRAB

Handles sheet steel bundles, any size 0" to 9" thick, 18" to 48" wide and any length.

Vertical DRUM LIFTER

Item C-465
\$30 25



For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

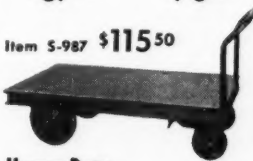
When Ordering—Always give "item" number. All prices are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.



UTILITIES RACK On Wheels

Item NS-415 M Item NS-415 R
(Roller bearing, 6" x 2", all metal (Ball bearing, 8" x 1 1/2", rubber-tired wheels).
\$67 75 \$70 20

Item S-987 \$115 50



Heavy Duty WAREHOUSE TRUCK

Use anywhere heavy loads are moved and rubber tired wheels are desired. 54" long, 28" wide, 42" high at handle. Top of platform 14" off floor. Welded construction. Heavy 3/8" plate. Two swivel wheels at handle end. Approx. wt. 300 lbs.

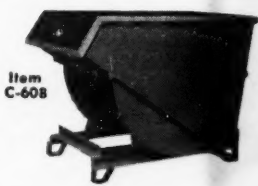
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Item B-731
\$181 50

A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive.

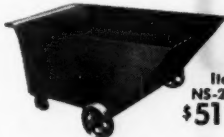
Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive



Item C-608

Automatic END DUMP

Ideal for handling and dumping of sand, scrap, castings, stampings and other heavy materials. Locks during loading by safety catch. Built for lift or fork truck or with casters. All welded construction. Standard size 1/2, 1 and 1 1/2 yds. capacity, other sizes on request.



Item NS-298
\$51 15

HAND DUMP TRUCK

Reinforced heavy sheet steel, 1/2 cubic yard capacity, two 8" semi-steel wheels and two 4" metal swivel casters. Wt. 125 lbs.

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Palmer Shile Co.

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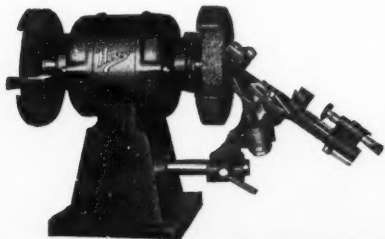
Are you having TROUBLES in your Drill Department!

Following are some of the most common and their causes.

Trouble	Cause
Oversize holes.	Unequal lip length.
Drill burns—will not cut.	Insufficient clearance.
Cutting edge chips or crumbles.	Too much clearance.
Outer corners of lip break down. Excessive wear on margins.	Speed too high.
Rough holes. Drill breakage. Drill point crushes.	Speed too slow or Feed too heavy.
Broken tangs.	Dirt or chips in socket or worn out socket.

Most of the above can be overcome by using a precision type Drill Grinder. A Hisey Drill Grinder will quickly pay for itself when you consider that drills that are correctly ground and kept sharp will (1) drill faster, (2) drill more holes per grind, (3) drill to exact size, (4) reduce breakage, (5) increase life of drill by removing less metal when sharpening.

A Hisey Drill Grinder will grind drills quickly and correctly with inexperienced operators.



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Hisey **THE HISEY-WOLF MACHINE CO.**
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

A REAL GRINDER

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**REAL
BARGAIN**



- 2 H.P. Motor
- 1 1/4" Diameter Shaft to Accommodate 12" x 2" Grinding Wheels
- Fabricated Steel Guards with Exhaust Outlets
- Fabricated Steel Pedestal
- 21" Between Wheels
- Ball Bearing Construction
- Manual Starter with Overload Protection

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**Versatility...
Productivity...**

In Standard Drilling Machines

BAKER MODEL 217 HEAVY DUTY DRILL

provides a selection of spindle speeds and feeds secured through pick-off gears. Machine can be adapted to heavy duty single spindle drilling, counterboring, boring, facing, forming or tapping operations and to multiple spindle operations using multiple spindle heads.

TWO-PIECE VERTICAL FRAME DESIGN

gives increased flexibility allowing use of spacer blocks between lower and upper frames to give increased clearance from ends of spindles to top of table.

SPEEDS. Standard machine spindle speed range is from 76 RPM to 614 RPM. For heavier boring or facing operations the machine can be furnished with slow speed top driving gears, giving a spindle speed range of from 27 RPM to 220 RPM. To secure slower speed range, only a top driving gear change is necessary.

Write **BAKER** for full information on Standard Baker Drills.

SINCE 1867

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DRILLING...TAPPING...KEYSEATING...CONTOUR GRINDING MACHINES

UNFAILING PERFORMANCE GUARANTEED



HOLO-KROME

Completely Cold Forged

SOCKET HEAD

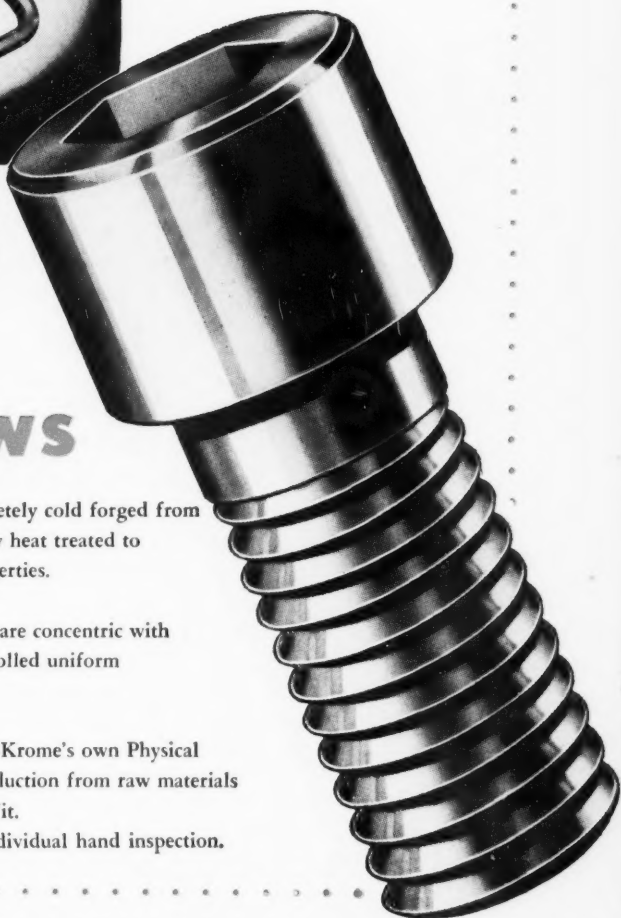
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CONTROLLED STRENGTH—Completely cold forged from special analysis alloy steel. Scientifically heat treated to develop the utmost in all physical properties.

CONTROLLED ACCURACY—Heads are concentric with body. True hexagon sockets with controlled uniform depth and smooth, taperless walls.

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